St. Martin's Engineering College

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Dhulapally, Secunderabad-500 100
www.smec.ac.in

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

I YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	MA101BS	Linear Algebra and Calculus	3	1	0	4	30	70	100
2	CH102BS	Engineering Chemistry	3	1	0	4	30	70	100
3	EE106ES	Basic Electrical Engineering	3	0	0	3	30	70	100
4	ME107ES	Engineering Workshop	1	0	3	2.5	30	70	100
5	EN103HS	Professional English	2	0	0	2	30	70	100
6	CH104BS	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	EN105HS	English Language and Communication Skills Lab	0	0	2	1	30	70	100
8	EE108ES	Basic Electrical Engineering Lab	0	0	2	1	30	70	100
		Total	**12**	**2**	**10**	**19**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
9	*TS109	Technical Seminar	0	0	2	-	100	-	100
		Induction Programme							

I YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4	30	70	100
2	AP202BS	Applied Physics	3	1	0	4	30	70	100
3	CS205ES	Programming for Problem Solving	3	1	0	4	30	70	100
4	ME206ES	Engineering Graphics	1	0	4	3	30	70	100
5	AP203BS	Applied Physics Lab	0	0	3	1.5	30	70	100
6	CS207ES	Programming for Problem Solving Lab	0	0	3	1.5	30	70	100
		Total	**10**	**3**	**10**	**18**	**180**	**420**	**600**
Mandatory Course (Non-Credit)									
7	*ES204BS	Environmental Science	3	0	0	-	100	-	100
8	*MP209	Micro Project	0	0	2	-	100	-	100

***MC – Satisfactory/Unsatisfactory**

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

II YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	CS301PC	R Programming	2	0	0	2	30	70	100
2	MA302BS	Computer Oriented Statistical Methods	3	1	0	4	30	70	100
3	CS303PC	Computer Organization and Architecture	3	0	0	3	30	70	100
4	CS304PC	Data Structures Using C	3	1	0	4	30	70	100
5	CS305ES	Analog and Digital Electronics	3	0	0	3	30	70	100
6	CS306PC	R Programming Lab	0	0	2	1	30	70	100
7	CS307PC	Data Structures Lab Using C	0	0	3	1.5	30	70	100
8	EC308ES	Analog and Digital Electronics Lab	0	0	2	1	30	70	100
9	CS309PC	IT Workshop Lab	0	0	3	1.5	30	70	100
		Total	**14**	**2**	**10**	**21**	**270**	**630**	**900**

II YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	CS401PC	Operating Systems	3	0	0	3	30	70	100
2	CS402PC	Python Programming	3	1	0	4	30	70	100
3	CS403PC	Java Programming	3	1	0	4	30	70	100
4	BE404MS	Business Economics and Financial Analysis	3	0	0	3	30	70	100
5	CS405PC	Discrete Mathematics	3	0	0	3	30	70	100
6	CS406PC	Operating Systems Lab	0	0	2	1	30	70	100
7	CS407PC	Python Programming Lab	0	0	3	1.5	30	70	100
8	CS408PC	Java Programming Lab	0	0	3	1.5	30	70	100
		Total	**15**	**2**	**8**	**21**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
9	*GS409MC	Gender Sensitization Lab	0	0	2	-	100	-	100

***MC – Satisfactory/Unsatisfactory**

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

III YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	CS501PC	Formal Languages & Automata Theory	3	1	0	4	30	70	100
2	CS502PC	Software Engineering	3	0	0	3	30	70	100
3	CS503PC	Computer Networks	3	0	0	3	30	70	100
4	CS504PC	Database Management System	3	0	0	3	30	70	100
5		Professional Elective-I / MOOC's	3	0	0	3	30	70	100
6		Professional Elective-II	3	0	0	3	30	70	100
7	CS505PC	Software Engineering Lab	0	0	3	1	30	70	100
8	CS506PC	Computer Networks Lab	0	0	3	1	30	70	100
9	CS507PC	Database Management System Lab	0	0	2	1	30	70	100
Total			**18**	**0**	**8**	**22**	**240**	**560**	**800**
Mandatory Course (Non-Credit)									
10	*IP508MC	Intellectual Property Rights	3	0	0	0	100	-	100

III YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	CS601PC	Machine Learning	3	1	0	4	30	70	100
2	CS602PC	Compiler Design	3	1	0	4	30	70	100
3	CS603PC	Design and Analysis of Algorithms	3	1	0	4	30	70	100
4		Professional Elective –III	3	0	0	3	30	70	100
5		Open Elective-I	3	0	0	3	30	70	100
6	CS604PC	Machine Learning Lab	0	0	3	1.5	30	70	100
7		Professional Elective-III Lab	0	0	3	1.5	30	70	100
8	EN606HS	Advanced Communication Skills Lab	0	0	2	1	30	70	100
Total			**15**	**3**	**8**	**22**	**270**	**630**	**900**
Mandatory Course (Non-Credit)									
10	*ES604BS	Environmental Science	3	0	0	0	100	-	100

***MC – Environmental Science – Should be Registered by Lateral Entry Students Only**

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

IV YEAR I SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	CS701PC	Cryptography & Network Security	3	0	0	3	30	70	100
2	CS702PC	Data Mining	2	0	0	2	30	70	100
3		Professional Elective -IV	3	0	0	3	30	70	100
4		Professional Elective -V	3	0	0	3	30	70	100
5		Open Elective - II	3	0	0	3	30	70	100
6	CS703PC	Cryptography & Network Security Lab	0	0	2	1	30	70	100
7	CS704PC	Industry Oriented Mini Project	0	0	0	2	--	100	100
8	CS705PC	Seminar	0	0	2	1	100	--	100
9	CS706PC	Project Stage – I	0	0	6	3	100	--	100
		Total	**14**	**0**	**10**	**21**	**380**	**520**	**900**
Mandatory Course (Non-Credit)									
10	*CI707MC	Constitution of India	3	0	0	0	100	-	100

IV YEAR II SEMESTER

S. No.	Course Code	Course Title	Hours per Week			Credits	Maximum Marks		
			L	T	P		Internal (CIE)	External (SEE)	Total
1	SM801MS	Organizational Behaviour	3	0	0	3	30	70	100
2		Professional Elective – VI	3	0	0	3	30	70	100
3		Open Elective - III	3	0	0	3	30	70	100
4	CS802PC	Project Stage – II	0	0	14	7	30	70	100
		Total	**9**	**0**	**14**	**16**	**120**	**280**	**400**

***MC – Satisfactory/Unsatisfactory**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LINEAR ALGEBRA AND CALCULUS

I B. TECH- I SEMESTER (R20)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
MA101BS	**B. Tech**	**3**	**1**	**0**	**4**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. Types of matrices and their properties.
2. Concept of a rank of the matrix which is used to know the consistency of system of linear equations.
3. Concept of Eigen values and eigenvectors and to reduce the quadratic form to canonical form.
4. Determine the maxima and minima of functions of several variables by using partial differential coefficients.
5. Evaluation of improper integrals using Beta and Gamma functions.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
2. Find the Eigen values and Eigen vectors, reduce the quadratic form to canonical form using orthogonal transformations.
3. Apply the Mean value theorems for the single variable functions.
4. Apply maxima and minima for functions of several variables and Lagrange's method of multipliers.
5. Evaluate the improper integrals using Beta and Gamma functions.

UNIT-I	**MATRICES**	**Classes: 12**

Matrices: Types of Matrices, Symmetric, Hermitian, Skew-symmetric, Skew-Hermitian, orthogonal matrices, Unitary Matrices, rank of a matrix by Echelon form and Normal form, Inverse of Non-singular Matrices by Gauss-Jordan method, System of linear equations, solving system of Homogeneous and Non- Homogeneous equations. Gauss elimination method, Gauss Seidel Iteration Method.

UNIT-II	**EIGEN VALUES AND EIGEN VECTORS**	**Classes:12**

Linear Transformation and Orthogonal Transformation, Eigen values and Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III	MEAN VALUE THEOREMS	Classes:10

Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean Value Theorem. Taylor's Series. Applications: Finding areas, volumes of revolutions of curves (Only in Cartesian coordinates)

UNIT-IV	FUNCTIONS OF SEVERAL VARIABLES	Classes: 10

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative, Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers. Application: Errors and approximations.

UNIT-V	SPECIAL FUNCTIONS	Classes: 10

Beta and Gamma functions, properties, relation between Beta and Gamma functions, evaluation of integrals using Beta and Gamma functions.

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition.
2. Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2017.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

REFERENCE BOOKS

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
2. B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

WEB REFERENCES

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/listing.php?category=4
2. https://www.e-booksdirectory.com/details.php?ebook=10830

MOOCS COURSES

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ENGINEERING CHEMISTRY

I B. TECH- I SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CH102BS	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. To provide basic knowledge on atomic, molecular orbitals and the bonding interaction between atoms
2. To analyze the impact of water hardness and its various methods for removal of hardness of water, numerical problems to calculate the hardness of water in a givensample
3. To discover the importance of electrical energy which originates from chemical reactions essential for industrial needs
4. To understand the basic concepts of spectroscopy and drug molecules to extrapolate their chemical knowledge in day to day life
5. To enable the students to understand the use of engineering materials such as polymers, lubricants and study the industrial applications in the field of engineering andtechnology

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Achieve the basic concepts of atomic, molecular and electronic changes related to molecular bonding and magnetism
2. Familiarize with fundamentals of treatment technologies and considerations for its design and implementation in water treatment plants
3. To extrapolate the knowledge of cell, electrode, electrolysis, electromotive force. To analyze and develop a technical solution to corrosion problems related to engineering materials
4. Acquire the significant knowledge about basic concepts of spectroscopy and synthesis of drug molecules would be known to the students
5. Comprehended and explore engineering applications of polymers and lubricants

UNIT-I	MOLECULAR STRUCTURE AND THEORIES OF BONDING	Classes: 10

Introduction to VBT, Postulates and draw backs of VBT- Atomic and Molecular orbitals, Linear Combination of Atomic Orbitals (LCAO), Introduction to Crystal Field Theory (CFT): Salient features of CFT- Crystal Field Splitting of transition metal ion d-orbitals in tetrahedral, octahedral and square planar geometries. Applications of CFT- color and magnetic properties.

Postulates of MOT, molecular orbitals of diatomic molecules-molecular orbital energy level diagrams of N_2, O_2 and CO molecules.

UNIT-II	WATER AND ITS TREATMENT	Classes: 12

Introduction-hardness of water-causes of hardness. Types of harness: Temporary and Permanent. Expression and units of hardness. Estimation of hardness of water by complexometric method (EDTA method), Numerical problems. Boiler troubles- scales, sludges, carryover and caustic embrittlement. Internal treatment- Calgon conditioning, phosphate conditioning and colloidal conditioning. External treatment of water- Ion exchange process. Desalination of brackish water- Reverse osmosis. Potable water and its specifications. Steps involved in the treatment of water by chlorination and ozonization.

UNIT-III	ELECTROCHEMISTRY AND CORROSION	Classes: 14

Electrochemical cells- electrode potential, standard electrode potential, Galvanic cell, Nernst equation- Applications. EMF of a cell. Types of electrodes- standard hydrogen electrode, calomel and glass electrode- construction and working. Numerical problems.

Batteries - Primary (Lithium cell) and secondary batteries (Lithium ion, Lead acid storage cell)- Applications.

Corrosion: Introduction, Causes and effects of corrosion- theories of chemical and electrochemical corrosion- mechanism of electrochemical corrosion. Corrosion control methods- Cathodic protection- sacrificial anode and impressed current cathodic methods. Metallic coatings- Methods of preparation of surface- Hot dipping- Galvanization and tinning. Electro plating and electroless plating.

UNIT-IV	SPECTROSCOPY AND SYNTHESIS OF DRUG MOLECULES	Classes: 08

Spectroscopy- Introduction, electromagnetic spectrum, principles of UV-visible, IR spectroscopy- selection rules and applications. Basic concepts of Nuclear magnetic resonance spectroscopy, chemical shift, spin-spin splitting. Magnetic resonance imaging.

Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT-V	MATERIAL CHEMISTRY	Classes: 12

Polymers: Introduction, Classification of polymers with examples. Types of polymerization: Addition and Condensation polymerization with examples.
Plastics: Introduction, Characteristics. Thermoplastic and thermosetting plastics. Compounding and fabrication of plastics (compression and injection molding). Preparation, properties and engineering applications of PVC, Teflon and Bakelite.
Lubricants: Introduction, Characteristics, mechanism-thick film, thin film, extreme pressure lubrication, properties- flash point, fire point, cloud point, pour point, mechanical stability and their significance- applications of lubricants.

TEXT BOOKS

1. P. C. Jain and M. Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company Ltd., New Delhi,18th edition (2018)
2. Prasanta Rath, B. Rama Devi, Ch. Venkataramana Reddy, S. Chakrovarthy, "A Text book of Engineering Chemistry", Cengage publications (2019)
3. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai & Co. Publishers., New Delhi,15th edition (2015)
4. C.N. Banwell, "Fundamentals of Molecular Spectroscopy"

REFERENCE BOOKS

1. B. H. Mahan, "University Chemistry", Narosa Publishing house, New Delhi, 3rd edition (2013)
2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. Nagin Chand & Company Ltd., 46th edition (2013)
3. J.D. Lee, "Concise Inorganic Chemistry", Willey Publications, 5th edition (2008)
4. P.W. Atkins, J.D. Paula, "Physical Chemistry", Oxford, 8th edition (2006)
5. G. L. David Krupadanam, D. Vijaya Prasad, K. Varaprasad Rao, K.L.N. Reddy and C. Sudhakar, "Drugs", Universities Press (India) Limited, Hyderabad (2007)

WEB REFERENCES

1. Chemistry: foundations and applications. J. J. Lagowski, editor in chief. New York, Macmillan Reference USA, c2004. 4v
2. Polymer data handbook. Edited by James E. Mark. 2nd ed. Oxford, New York, Oxford University Press, 2009
3. https://www.wyzant.com/resources/lessons/science/chemistry
4. http://www.chem1.com/acad/webtext/virtualtextbook.html

E -TEXT BOOKS

1. Krishnamurthy, N., Vallinayagam, P., Madhavan, D., Engineering Chemistry, ISBN: 9789389347005, eBook ISBN: 9789389347012, Edition: Fourth Edition
2. Vijayasarathy, P. R., Engineering Chemistry, Print Book ISBN : 9789387472778, eBook ISBN : 9789387472785, Edition : Third Edition

MOOCS COURSES

1. https://onlinecourses-archive.nptel.ac.in
2. https://www.mooc-list.com/tags/chemistry

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BASIC ELECTRICAL ENGINEERING

I B. TECH- I SEMESTER (R20)

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EE106ES	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To introduce the concepts of electrical circuits and its components
2. To understand magnetic circuits, DC circuits and AC single phase &three phase circuits
3. To study and understand the different types of DC/AC machines and Transformers.
4. To import the knowledge of various electrical installations.
5. To introduce the concept of power, power factor and its improvement.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To analyse and solve electrical circuits using network laws.
2. To analyse and solve electrical circuits using theorems.
3. To understand and analyse basic Electric and Magnetic circuits.
4. To study the working principles of Electrical Machines.
5. To introduce components of Low Voltage Electrical Installations.

UNIT-I	D.C.CIRCUITS	Classes:15

Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation. Superposition, The venin's and Norton's Theorems.

Time-domain analysis of first-order RL and RC circuits.

UNIT-II	A.C.CIRCUITS	Classes:10

Representationofsinusoidalwaveforms,peakandrmsvalues,phasorrepresentation,realpower, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L,C,RL,RC,RLCcombinations(seriesandparallel),resonanceinseriesRL-Ccircuit.

UNIT-III	TRANSFORMERS	Classes:15

Ideal and practical transformer, EMF equation, operation on no load and on load, OC and SC tests, phasor diagrams equivalent circuit, losses in transformers, regulation, Efficiency and condition for maximum efficiency, Auto-transformer.

UNIT-IV	ELECTRICAL MACHINES	Classes:15

Generation of rotating magnetic fields, Construction and working of a three-phase induction Motor, Significance of torque-slip characteristics. Loss components and efficiency. Construction, working, Torque-speed characteristics of separately excited, shunt, series, compound dc motors.

UNIT-V	ELECTRICAL INSTALLATIONS	Classes:10

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, electrical Safety precautions in handling electrical appliances, electric shock, first aid for electric shock, safety rules.

TEXT BOOKS

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata, McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S.Bobrow, Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson,2010

REFERENCE BOOKS

1. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.
2. P. V. Prasad, S. Sivanagaraju, R. Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1st Edition, 2013.
3. V. D. Toro, – Electrical Engineering Fundamentals Prentice Hall India, 1989.

WEB REFERENCES

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits-topic/circuits-
4. resistance/a/ee-voltage-and-current
5. https://circuitglobe.com/

E –TEXT BOOKS

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

MOOCS COURSES

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ENGINEERING WORKSHOP

I B. TECH- I SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
ME107ES	B. Tech	1	0	3	2.5	30	70	100

COURSE OBJECTIVES

To learn

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipment's and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at workplace.
5. It explains the construction, function, use and application of different working tools, equipment and machines.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including Fitting, Carpentry, Foundry, Tin-smithy, House Wiring and Welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
4. Apply basic electrical engineering knowledge for house wiring practice.

LIST OF EXPERIMENTS

TRADES FOR EXERCISES (Any two exercises from each trade)

1. Tin-Smithy – (Square Tin, Cone and Cylinder)
2. Carpentry – (T-Lap Joint, Planning Sawing & Dovetail Joint)
3. Welding Practice – (Arc Welding-Butt Joint, Lap Joint &T-Joint)
4. Black Smithy – (Round to Square, S-Hook &U-Clamp)
5. Foundry – (Mould using Single Piece and Split Pattern)
6. Fitting – (V-Fit, Square Filing & Semi-circular fit)
7. House-wiring – (Two-way Switch and one-way switch in series)

TRADES FOR DEMONSTRATION

8. Plumbing, Machine Shop, Power tools in construction, Wood turning lathe and Casting Process.

Note: At least perform 10 Exercises out of 14 Exercises.

TEXT BOOKS

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual / Venkat Reddy/ BS Publications/Sixth Edition
3. Workshop Technology by Chapman
4. A Textbook Of Workshop Technology : Manufacturing Processes/J. K GUPTA

REFERENCE BOOKS

1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP
3. Workshop Technology by Hazra-Chowdhary
4. Production Engineering by R.K.Jain

WEB REFERENCES

1. https://nptel.ac.in/courses/112105126/
2. https://nptel.ac.in/downloads/112105127/
3. https://nptel.ac.in/courses/112107145/
4. https://nptel.ac.in/courses/122104015/

E -TEXT BOOKS

1. http://103.135.169.82:81/fdScript/RootOfEBooks/MED/Introduction Workshop%20Technology
2. https://www.quora.com/Download-free-mechanical-engineering-ebooks-sites

MOOCS COURSES

1. http://www.nits.ac.in/workshops/Workshop_on_MOOCS_26082017.pdf
2. https://www.nitttrc.ac.in/swayam/index.html

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROFESSIONAL ENGLISH

I B. TECH- I SEMESTER (R20)

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN103HS	B. Tech	2	0	0	2	30	70	100

COURSE OBJECTIVES:

To enable students

1. To enhance their vocabulary and basic grammar rules for communicative competence.
2. To hone their comprehensive skills through various reading techniques.
3. To develop the professional writing with the practice of formal letters, e-mails, reports, resumes, etc.
4. To use various sentence structures effectively in formal and informal contexts.
5. To improve scientific and technical communication skills through technical vocabulary and appropriate prose texts.

COURSE OUTCOMES:

Upon successful completion of the course, the students are able to

1. Use vocabulary effectively and syntactically.
2. Translate the reading techniques and apply them in literary texts.
3. Demonstrate enhanced competence in standard Written English.
4. Develop the competence in writing professional documents.
5. Exhibit appropriate communicative approaches to suit various contexts.

UNIT-I	THE RAMAN EFFECT	Classes:7

Vocabulary: Word Formation, Use of affixes,
Grammar: Articles, Prepositions
Writing: Paragraph Writing, Organizing principles of Paragraphs in documents

UNIT-II	THE LOST CHILD	Classes:9

Vocabulary: Synonyms and Antonyms
Grammar: Noun – Pronoun Agreement and Concord
Reading: Significance & Techniques of reading; Skimming – Reading for the gist of a text; Scanning– Reading for specific information; Intensive; Extensive reading; SQ3R Technique; Reading Comprehension;
Reading Poetry -The Road Not Taken
Writing: Narrative Writing

UNIT-III	SATYA NADELLA'S EMAIL TO HIS EMPLOYEES	Classes:10

Vocabulary: Homonyms-Homophones-Homographs
Grammar: Tenses
Writing : Significance & Effectiveness of Writing; Writing Descriptions; Letter writing; E-mail writing

UNIT-IV	WHAT SHOULD YOU BE EATING?	Classes:10

Vocabulary: Technical vocabulary; Words from Foreign Languages; abbreviations and acronyms
Grammar: Misplaced Modifiers; Redundancies and Cliches
Writing: Information Transfer, Note Making, Writing an Abstract and Report Writing

UNIT-V	HOW A CHINESE BILLIONAIRE BUILT HER FORTUNE	Classes:9

Vocabulary: Words often Confused; Idioms and Phrasal verbs, One- word Substitutes;
Grammar: Conditional Sentences; Degrees of Comparison; Simple-Complex-Compound Sentences and Common errors Writing:
Essay writing

TEXT BOOKS:

1. Sudarshana, N.P. and Savitha, C. (2018). English forEngineers. Cambridge University Press.
2. Education for Life and Work – English Workbook prepared by English Faculty of St. Martin's Engineering College.

REFERENCE BOOKS:

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Zinsser, William. (2001). On Writing Well. Harper Resource Book.

WEB REFERENCES:

1. www.edufind.com
2. www.myenglishpages.com
3. http://grammar.ccc.comment.edu
4. http://owl.english.prudue.edu

E –TEXT BOOKS:

1. http://bookboon.com/en/communication-ebooks-zip
2. http://learningenglishvocabularygrammar.com/files/idiomsandphraseswithmeaningsandexamlespdf.pdf

MOOCS COURSES

1. https://mooec.com/courses/grammar-guru-1
2. https://mooec.com/courses/learning-styles

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ENGINEERING CHEMISTRY LABORATORY

I B. TECH- I SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CH104BS	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. Estimation of hardness and chloride content in water to check its suitability for drinking purpose
2. To find the concentration of ions present in an unknown solution
3. To know the handling procedure of colorimetric and conductometric instruments
4. The fundamentals of drug synthesis
5. The measurement of physical properties like surface tension, viscosity and acid value

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the total dissolved salts present in a sample of water
2. Determine the concentration of ions existing in a solution
3. Find the strength of an acid by conductometric methods
4. Acquire basic knowledge on the chemical reaction used to synthesize drug molecules like aspirin and Paracetamol
5. Select lubricants for various purposes such as to reduce the friction between two movable surfaces and to determine the surface tension of a given liquid

LIST OF EXPERIMENTS

Volumetric Analysis

1. Determination of total hardness of water by complex metric method using EDTA.
2. Determination of chloride content of water by Argentometry.
3. Determination of acid value of coconut oil.

Potentiometry

4. Determination of Fe^{2+} ions present in the given sample by Potentiometric titration.

Conductometry

5. Estimation of HCl by conductometric titration.
6. Estimation of acetic acid by conductometric titration.

Colorimetry

7. Estimation of Copper by colorimetric method.

Synthesis of Drugs

8. Synthesis of aspirin and Paracetamol.

Physical constants

9. Determination of viscosity of the given sample by using Ostwald's Viscometer.
10. Determination of surface tension of a given liquid using stalagmometer.

TEXT BOOKS

1. Senior practical physical chemistry, B. D. Khosla, A. Gulati and V. Garg (R. Chand and Co., Delhi)
2. Prasanta Rath, B. Rama Devi, Ch. Venkataramana Reddy, S. Chakrovarthy, "A Text book of Engineering Chemistry", Cengage publications (2019)
3. An introduction to practical; chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, New Delhi)
4. Vogel's text book of practical organic chemistry, 5th edition.
5. S. S. Dhara, Text book on experiments and calculations in engineering chemistry, B.S Publications

REFERENCE BOOKS

1. G. H. Jeffery, J. Bassett, J. Mendham and R. C. Denney, "Vogel's Text Book of Quantitative Chemical Analysis"
2. O. P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age International Publishers
3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India

WEB REFERENCES

1. Phillip E. Savage, Industrial & Engineering Chemistry: At the Forefront of Chemical Engineering Research since 1909, *Ind. Eng. Chem.Res.* 20195811
2. Elias, AI. Sundar Manoharan S. and Raj, H. "Laboratory Experiments for General Chemistry", I.I.T. Kanpur, 1997

E -TEXT BOOKS

1. Payal B Joshi, Experiments In Engineering Chemistry, Edition: First, ISBN: 978-93-85909-13-9, Publisher: I.K. International Publishing House Pvt. Ltd
2. Mohapatra, Ranjan Kumar, Engineering Chemistry With Laboratory Experiments, ISBN: 978- 81-203-5158-5, PHI Learning Private Limited

MOOCS COURSES

1. https://sce.ethz.ch/en/programmes-and-courses/suche-angebote.html?polycourseId=1299
2. https://www.classcentral.com/course/open2study-chemistry-building-blocks-of-the-world-1297

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY

I B. TECH- I SEMESTER (R20)

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN105HS	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES:

To train students

1. To use accurate and appropriate pronunciation through the practice of phonetic sounds, symbols, word accent and into nation.
2. To improve their fluency in spoken English and neutralize their mother tongue influence through JAM Sessions, Role-play, etc.
3. To comprehend the speech of people of various regions through Listening practice exercises.
4. To enable students to transfer information verbally with the right usage of Body language through individual and group activities.
5. To understand nuances of English language by practicing various exercises at Multi-media lab.

COURSE OUTCOMES:

Upon successful completion of the course, student will be able to

1. Differentiate the speech sounds in English and demonstrate accurate pronunciation.
2. Communicate with others in clear and confident manner.
3. Improve their effective and empathetic listening ability.
4. Show the zeal to participate in Public Speaking Sessions.
5. Neutralize the Mother tongue influence in day to communication.

LIST OF EXPERIMENTS:

EXERCISE: I

CALL LAB:

Introduction to Phonetics – Speech sounds - vowels and consonants

ICS LAB:

Ice-breaking Activity – Non-verbal Communication

EXERCISE: II

CALL LAB:

Minimal Pairs – Consonant Clusters – Past Tense Marker and Plural Marker Rules

ICS LAB:

Role Play – Expressions in various Situations – Making Requests and Seeking Permissions

EXERCISE: III

CALL LAB:

Structure of Syllables – Word Accent –Stress shift–Intonation

ICS LAB:

Telephone Communication –Etiquette

EXERCISE: IV

CALL LAB:

Listening Comprehension Tests

ICS LAB:

Presentations Skills & JAM Session

EXERCISE: V

CALL LAB:

Mother Tongue Interference – Differences in British and American Pronunciation

ICS LAB:

Interview Skills – Mock Interviews

TEXT BOOKS:

1. ELCS Lab Manual prepared by English faculty of St. Martin's Engineering College.
2. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

REFERENCE BOOKS:

1. T Balasubramanian. A Textbook of English Phonetics forIndian Students, Macmillan,2008
2. J Sethi et al. A Practical Course in English Pronunciation, Prentice Hall India, 2005.
3. Priyadarshi Patnaik. Group Discussions and Interviews, Cambridge University Press Pvt Ltd2011.
4. Arun Koneru, Professional Speaking Skills, Oxford University Press, 2016.

WEB REFERENCES:

1. https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935321&section=References
2. Argyle, Michael F., Alkema, Florisse, & Gilmour, Robin. "The communication of friendly and hostile attitudes: Verbal and nonverbal signals." European Journal of Social Psychology, 1, 385- 402:1971
3. Blumer, Herbert. Symbolic interaction: Perspective and method. Engle wood Cliffs; NJ: Prentice Hall.1969

E –TEXT BOOKS:

1. Mc corry Laurie Kelly Mc Corry Jeff Mason, Communication Skills for the Healthcare Professional, 1st edition, ISBN:1582558140, ISBN-13:9781582558141
2. Robert E Owens, Jr, Language Development, 9th edition, ISBN:0133810364, 9780133810363

MOOCS COURSES

1. https://www.coursera.org/specializations/improve-english
2. https://www.edx.org/professional-certificate/upvalenciax-upper-intermediate-english

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

BASIC ELECTRICAL ENGINEERING LABORATORY

I B. TECH- I SEMESTER (R20)

Course Code	Category	Hours /Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EE108ES	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES:

To learn

1. To analyze a given network by applying various electrical laws
2. To analyze a given network by applying various network theorems
3. To know the response of electrical circuits for different excitations
4. To calculate, measure and know the relation between basic electrical parameters.
5. To analyze the performance characteristics of DC and AC electrical machines

COURSE OUTCOMES:

Upon successful completion of the course, the student is able to

1. Get an exposure to basic electrical laws.
2. Understand the response of different types of electrical circuits
3. Understand the response of different types of electrical Theorems
4. Understand different types of Excitations.
5. Understand the basic characteristics of transformers and electrical machines.

LIST OF EXPERIMENTS

PART-A

1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits using DC excitation
4. Transient Response of RLC Series circuit using DC excitation
5. Resonance in series RLC circuit.
6. Verification of Super position theorem.
7. Verification of Thevenin's Theorem.
8. Verification of Norton's Theorem.

PART-B

9. O.C. & S.C. Tests on Single Phase Transformer.
10. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation).
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor.
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor

*Note: Any five experiments from Part-A and Part-B.

TEXT BOOKS

1. Basic Electrical Engineering - D.P. Kothari and I.J. Nagrath, 3rd edition 2010, Tata McGraw Hill.
2. D.C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L.S.Bobrow,Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. Electrical and Electronics Technology, E. Hughes, 10th Edition, Pearson,2010

REFERENCE BOOKS

1. Electrical Engineering Fundamentals, Vincent Deltoro, Second Edition, Prentice Hall India, 1989.
2. P.V.Prasad, S.Sivanagaraju, R.Prasad, "Basic Electrical and Electronics Engineering" Cengage Learning, 1stEdition, 2013.
3. V. D. Toro, – Electrical Engineering Fundamentals Prentice Hall India,1989.

WEB REFERENCES

1. https://www.electrical4u.com/
2. http://www.basicsofelectricalengineering.com/
3. https://www.khanacademy.org/science/physics/circuits- topic/circuits-resistance/a/ee-voltage-and-current
4. https://circuitglobe.com/

E –TEXT BOOKS

1. https://easyengineering.net/basic-electrical-engineering-by-wadhwa/
2. https://easyengineering.net/objective-electrical-technology-by-mehta/

MOOCS COURSES

1. https://nptel.ac.in/courses/108108076/1
2. https://nptel.ac.in/courses/108102146/
3. https://nptel.ac.in/courses/108108076/35

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ADVANCED CALCULUS

I B. TECH- II SEMESTER (R20)								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIE**	**SEE**	**Total**
MA201BS	**B. Tech**	**3**	**1**	**0**	**4**	**30**	**70**	**100**

COURSE OBJECTIVES

To learn

1. Methods of solving the differential equations of first and higher order
2. Evaluation of multiple integrals and their applications
3. The physical quantities involved in engineering field related to vector valued functions
4. The basic properties of vector valued functions and their applications
5. Vector point functions and scalar point functions

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Identify whether the given differential equation of first order is exact or not.
2. Solve higher order differential equation and apply the concept of differential equation to real problems.
3. Evaluate the multiple integrals and apply the concept to find areas andvolumes.
4. Is able to find gradient, directional derivative, divergence and curl.
5. Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I	**FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS**	**Classes: 10**

Exact, linear and Bernoulli's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type, Applications: Newton's law of cooling, Law of natural growth and decay, Simple Harmonic Motion.

UNIT-II	**ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER**	**Classes: 12**

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sinax, cosax, polynomial in x^m, $e^{ax}V(x)$ and $xV(x)$,method of variation of parameters, Applications: LCR Circuit.

UNIT-III	**MULTIPLE INTEGRATION**	**Classes:12**

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals)

UNIT-IV	VECTOR DIFFERENTIATION	Classes: 12

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors

UNIT-V	VECTOR INTEGRATION	Classes: 12

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications

TEXT BOOKS

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006
3. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCE BOOKS

1. Paras Ram, Engineering Mathematics, 2nd Edition, CBS Publishes
2. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.

WEB REFERENCES

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/listing.php?category=4
2. https://www.e-booksdirectory.com/details.php?ebook=10830

MOOCS COURSE

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

APPLIED PHYSICS

I B. TECH- II SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AP202BS	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. The fundamental postulates of quantum mechanics.
2. The concepts related to semiconductors.
3. The concepts related to PN Junction diode and its applications.
4. The basic concepts of laser and optical fiber and its applications.
5. The fundamentals of dielectrics and magnetic materials.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to

1. Demonstrate the fundamental concepts on Quantum behavior of matter in its microstate.
2. Understand the knowledge of fundamentals of Semiconductor physics.
3. Design and explain the characteristics of Optoelectronic devices.
4. Analyze the properties of Laser and Optical Fibers and its application in engineering fields.
5. Design, characterize and prepare new materials for various engineering applications by using dielectric and magnetic materials.

UNIT-I	QUANTUM MECHANICS	Classes: 12

Introduction to quantum physics, Black body radiation, Planck's Law, Photoelectric effect, Compton effect, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II	SEMICONDUCTOR PHYSICS	Classes: 14

Intrinsic and Extrinsic semiconductors, Carrier Concentration in Intrinsic and Extrinsic semiconductors Dependence of Fermi level on Temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics.

UNIT-III	OPTOELECTRONICS	Classes: 10

Radiative and non-radiative recombination mechanisms in semiconductors and LED: Device structure, Materials, Characteristics and figures of merit, Semiconductor photo detectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.

UNIT-IV	LASERS AND FIBRE OPTICS	Classes: 12

Lasers: Introduction to interaction of radiation with matter, Characteristics, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, He-Ne laser and Semiconductor laser, Applications of laser. Fibre Optics: Introduction, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, Applications of optical fibres in Communication System and Sensors.

UNIT-V	Dielectric and Magnetic Properties of Materials	Classes: 12

Introduction to Dielectrics, Polarization, Permittivity and Dielectric constant, Types of Polarization (Qualitative), Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectric. Magnetization, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and Domain theory of ferromagnetism – Hysteresis curve based on domain theory, Applications of magnetic materials.

TEXT BOOKS

1. Engineering Physics, B.K. Pandey, S. Chaturvedi – Cengage Learning.
2. Halliday and Resnick, Physics-Wiley.
3. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar -S.Chand.
4. Introduction to Solid State Physics by Charles Kittel (Publishers: John Wiley&Sons)

REFERENCE BOOKS

1. Richard Robinett, Quantum Mechanics.
2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, Mc Graw-Hill inc.(1995).
3. Online Course: "Optoelectronics Materials and Devices" by Monica Katiyar and Deepak Gupta NPTEL.

WEB REFERENCES

1. Introductory Quantum Mechanics:https://nptel.ac.in/courses/115104096/
2. Fundamental concepts of semi conductors:https://nptel.ac.in/courses/115102025/
3. SemiconductorOptoelectronics:https://nptel.ac.in/courses/115102103/
4. Fibre Optics:https://nptel.ac.in/courses/115107095/

E -TEXT BOOKS

1. library genesis: https://libgen.is/

MOOCS COURSES

1. Swayam: https://swayam.gov.in/nd1_noc19_ph13/preview
2. Alison :https://alison.com/courses?&category=physics

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMMING FOR PROBLEM SOLVING

I B. TECH- II SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS205ES	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems.

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C Programs.
3. To code and test, a given logic in C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs
6. Searching and sorting problems

UNIT-I	INTRODUCTION TO C PROGRAMMING LANGUAGE	Classes: 16

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.
Introduction to C Programming Language: I/O: Simple input and output with scanf and printf, variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, type conversion

UNIT-II	CONDITIONAL BRANCHING, LOOPS, ARRAY AND STRINGS	Classes: 14

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, go to, Iteration with for, while, do- while loops.
Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays.
Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings.

UNIT-III	STRUCTURE AND POINTER	Classes:10

Structures: Defining structures, initializing structures, unions, Array of structures.
Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self- referential structures, usage of self-referential structures in linked list (no implementation), Enumeration data type.
Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT-IV	FUNCTION AND STORAGE CLASSES	Classes: 12

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries
Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions
Storage classes (auto, extern, static and register)

UNIT-V	FILES AND PRE-PROCESSOR	Classes: 12

Preprocessor: Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef.
Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions

TEXT BOOKS

1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI
2. Computer System & Programming in C by S Kumar & S Jain, Nano Edge Public publications, Meerut.
3. Fundamentals of Computing and C Programming, R. B. Patel, Khanna Publications, 2010, New Delhi.

REFERENCE BOOKS

1. Computer Fundamentals and Programming in C, Reema Theraja,Oxford
2. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998,TMH
3. Theory and problem of programming with C, Byron CGottfried, TMH

WEB REFERENCES

1. https://www.tutorialspoint.com/cprogramming/
2. https://www.tutorialspoint.com/cplusplus/
3. https://www.cprogramming.com/tutorial/c-tutorial.html

E -TEXT BOOKS

1. https://fresh2refresh.com/c-programming/
2. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with-examples/
3. https://www.sanfoundry.com/simple-c-programs/

MOOCS COURSE

1. nptel.ac.in/courses/106105085/4
2. https://www.quora.com/Are-IIT-NPTEL-videos-good-to-learn-basic-C-programming

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ENGINEERING GRAPHICS

I B. TECH- II SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
ME206ES	B. Tech	1	0	4	3	30	70	100

COURSE OBJECTIVES

To learn

1. The course aims at empowering the students with drafting skills and enhancing their visualization capacity in order to draw different views of the given object.
2. To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
3. To expose them to existing national standards related to technical drawings.
4. To impart knowledge about standard principles of orthographic projection of objects.
5. It will help students to use the techniques, skills, and modern engineering tools and communicate effectively.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Familiarize with the fundamentals and standards of Engineering graphics Project orthographic projections of lines and plane surfaces.
2. Convert orthographic views to isometric views and vice-versa and know the basics of AutoCAD.
3. Preparing working drawings to communicate the ideas and information.
4. Know and use common drafting tools with the knowledge of drafting standards.

UNIT-I	INTRODUCTION TO ENGINEERING DRAWING	Classes: 15

Introduction to Engineering Graphics: Principles of Engineering Graphics and their significance, Usage of Drawing instruments, lettering, Conic sections including Rectangular Hyperbola (General method only); Cycloid, Epicycloids and Involutes.

Scales: Plain & Diagonal Scales.

UNIT-II	ORTHOGRAPHIC PROJECTIONS	Classes:15

Projections of points: Principles of orthographic projections – conventions – first and third angle projections. Projection of points in all quadrants.

Projection Of Lines – lines inclined to single plane, lines inclined to both the planes.

Projection of Planes: Projection of regular planes – planes inclined to one plane, planes inclined to both planes.

UNIT-III	PROJECTION OF SOLIDS & SECTION OF SOLIDS	Classes:12

Projection of Solids: Projections of regular solids like cube, prism, pyramid, cylinder and cone. Axis inclined to both the reference planes.

Section of Solids: Sectioning of above solids in simple vertical position with the cutting plane is inclined to the one plane and perpendicular to the other –true shape of section.

UNIT-IV	DEVELOPMENT OF SURFACES & ISOMETRIC PROJECTIONS	Classes: 15

Development of Surfaces: Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions –Plane Figures, Simple and Compound Solids.

UNIT-V	TRANSFORMATION OF PROJECTIONS & INTRODUCTION AUTO CAD	Classes: 15

Transformation of Projections: Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects.
Introduction to Auto CAD: Introduction, Salient features of AutoCAD software, Basic Commands, construction, editing and dimensioning, two dimensional drawings.

TEXT BOOKS

1 Engineering Drawing - N.D. Bhatt & V.M. Panchal, 50th edition, 2013-Charotar Publishing House, Gujarat.
2 Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
3 K.L.Narayana, P. Kannaiah, “Engineering Drawing”, SciTech Publishers. 2nd Edition, 2013
4 Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson, 2nd Edition, 2009.

REFERENCE BOOKS

1 Venugopal K. and Prabhu Raja V., “Engineering Graphics”, New Age International (P) Limited,2011.
2 K. V. Natarajan, “A text book of Engineering Graphics”, Dhana lakshmi Publishers, Chennai,2015.
3 Gopalakrishna K.R., “Engineering Drawing” (Vol. I&II combined), Subhas Stores, Bangalore,2007.
4 Trymbaka Murthy, “Computer Aided Engineering Drawing", I.K. international Publishing House, 3rd Edition, 2011.

WEB REFERENCES

1 http://freevideolectures.com/Course/3420/Engineering-Drawing
2 https://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing
3 https://www.wiziq.com/tutorials/engineering-drawing
4 http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics

E -TEXT BOOKS

1 http://rgpv-ed.blogspot.com/2009/09/development-of-surfaces.html
2 http://www.techdrawingtools.com/12/l1201.htm

MOOCS COURSES
1 https://nptel.ac.in/course.php 2 https://swayam.gov.in/explorer

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

APPLIED PHYSICS LAB

I B. TECH- II SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
AP203BS	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To study semiconductor devices.
2. To verify the Biot –Savart law.
3. To experience resonance phenomena.
4. To compare the experimental results with the class room learning.
5. The basic experimental skills which are very essential for an engineering student.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

1. Learn the working principles of PN Junction diode.
2. Examine the electrical and magnetic properties of materials.
3. Determine the characteristics of Opto-Electronic devices.
4. Understand the basic principles of Optical Fibers.
5. Analyze the basic electronic circuits.

LIST OF EXPERIMENTS

1. **Energy gap of P-N junction diode**: To determine the energy gap of a semiconductor diode.
2. **Solar Cell**: To study the V-I Characteristics of solar cell.
3. **Light emitting diode**: Plot V-I and P-I characteristics of light emitting diode.
4. **Stewart – Gee's experiment**: Determination of magnetic field along axis of the current carrying coil.
5. **Hall Effect**: To determine Hall co-efficient of given semiconductor.
6. **Photoelectric effect**: To determine work function of a given material.
7. **LASER**: To study the characteristics of LASER sources.
8. **Optical Fibre**: To determine the Numerical aperture and bending losses of optical fibres.
9. **LCR Circuit**: To determine the Quality factor of LCR circuit.
10. **RC Circuit**: To determine the Time constant of RC circuit.

NOTE: Any 8 experiments are to be performed

TEXT BOOKS

1. Engineering Physics, B.K. Pandey, S. Chaturvedi –Cengage Learning. Halliday and Resnick, Physics-Wiley.
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar-S.Chand.

REFERENCE BOOKS

1. Main, I. G., Vibrations and Waves in Physics. 2nd. edition. Cambridge University Press, 1984.
2. Eugene Hecht, “Optics” , 5th Edition,AdelphiUnioversity,2016

WEB REFERENCES

1. Fundamental concepts of semi conductors :https://nptel.ac.in/courses/115102025/
2. Semiconductor Optoelectronics: https://npte l.ac.in/courses/115102103/

E -TEXT BOOKS

1. http://www.lehman.edu/faculty/kabat/F2019-166168.pdf
2. https://www.scribd.com/doc/143091652/ENGINEERING-PHYSICS-LAB-MANUAL

MOOCS COURSES

1. Swayam :https://swayam.gov.in/nd1_noc19_ph13/preview
2. Alison :https://alison.com/courses?&category=physics

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMMING FOR PROBLEM SOLVING LAB

I B. TECH- II SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS207ES	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of C programming language.
4. To learn the usage of structured programming approach in solving problems

COURSE OUTCOMES

Upon successful completion of the course, the student is able

1. To write algorithms and to draw flowcharts for solving problems.
2. To convert the algorithms/flowcharts to C programs.
3. To code and test a given logic in C programming language.
4. To decompose a problem into functions and to develop modular reusable code.
5. To use arrays, pointers, strings and structures to write C programs.
6. Searching and sorting problems

LIST OF EXPERIMENTS

1. Write a simple program that prints the results of all the operators available in C
2. Write a simple program to convert the temperature from Fahrenheit to Celsius
3. Write a program for find the max and min from the three numbers using if else statement
4. Write a C program to find the roots of a Quadratic equation.
5. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
6. Write a program that finds if a given number is a prime number
7. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
8. Write a C program to generate the Fibonacci sequence of numbers.
9. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
10. Write a C program to find the minimum, maximum and average in an array of integers
11. Write a C program that uses functions to perform the following:1) Addition of Two Matrices 2) Multiplication of Two Matrices
12. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba,

13. To insert a sub- string into a given main string from a given position.e.ii.Todeleten Characters from a given position in a given string
14. Write a C program that displays the position of a character ch in the stringSor– 1ifS doesn‘t contain ch
15. Write a C program to count the lines, words and characters in a given text.
16. Define a structure student to store the details like Roll Number, Name, and Marks in three subjects of a student and display the same.
17. Write a C program to perform specified operation on complex numbers.
18. Write a C program to store the information about three students.
19. Write a C Program to illustrate the use of nested structures.
20. Write a C Program to perform arithmetic operations using pointers.
21. Write a C Program to display the array elements in reverse order using pointer.
22. Write a C Program to to find factorial of a number using functions.
23. Write a C Program to find factorial of a number using recursive functions.
24. Write a C Program to implement call by value and call by reference.
25. Write a C Program to copy the data from one file to another
26. Write a C Program to append data to the file
27. Write a C Program to merge the two files
28. Write a C Program to display the file content on reverse order.
29. Write a C Program to count number of vowels, consonants, digits, words in a given file

TEXT BOOKS

1. The C Programming Language by Dennis M Ritchie, Brian W.Kernigham,1988, PHI Publications, 2010, New Delhi.
2. Computer System & Programming in C by SKumar & SJain, Nano Edge Public publications, Meerut.
3. Fundamentals of Computing and C Programming, R. B. Patel, Khanna

REFERENCE BOOKS

1. Computer Fundamentals and Programming in C, Reema Theraja, Oxford
2. Information technology, Dennis P.Curtin, Kim Foley,Kunal Sen,Cathleen Morin, 1998,TMH
3. Theory and problem of programming with C, Byron C Gottfried,TMH.

TEXT BOOKS

1. https://www.tutorialspoint.com/cprogramming/
2. https://www.w3schools.in/c-tutorial/
3. https://www.cprogramming.com/tutorial/c-tutorial.html
4. www.studytonight.com/c/

REFERENCE BOOKS

1. http:///programming-with-c
2. https://developerinsider.co/best-c-programming-book-for-beginners/

MOOCS COURSES

1. https://nptel.ac.in/courses/106105085/4
2. https://www.coursera.org/courses?query=c%20programming

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ENVIRONMENTAL SCIENCE

I B. TECH- II SEMESTER (R20)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
*ES204BS	B. Tech	3	0	0	-	100	--	100

COURSE OBJECTIVES

To learn

1. Analyze the inter relationship between living organism and environment
2. Describe various types of natural resources available on the earth surface
3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity
4. Explain the causes, effects and control measures of various types of environmental pollutions
5. Understand the importance of environment by assessing its impact on the human world

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Differentiate between various biotic and a biotic components of ecosystem
2. Describe the various types of natural resources
3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India
4. Illustrate causes, effects, and control measures of various types of environmental pollutions
5. Understand technologies on the basis of ecological principles environmental regulations which in turn helps in sustainable development

UNIT-I	ECOSYSTEMS	Classes: 8

Definition, Scope, and Importance of ecosystem. Classification, structure and function of an ecosystem, food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification.

UNIT-II	NATURAL RESOURCES	Classes: 8

Classification of Resources: Living and Non-Living resources.
Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources
Land resources: Forest resources.
Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III	BIODIVERSITY AND BIOTIC RESOURCES	Classes: 7
Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic, optional values and hotspots of biodiversity. Endangered and endemic species of India, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.		
UNIT-IV	**ENVIRONMENTAL POLLUTION**	**Classes: 9**
Types of pollution, Causes, effects and prevention and control measures of air, water, soil, noise and thermal pollution. Solid waste and e-waste management.		
UNIT-V	**ENVIRONMENTAL POLICY AND SUSTAINABLE DEVELOPEMENT**	**Classes: 10**
Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion- crazy consumerism. Green building concept. Water conservation, Rainwater harvesting, watershed management. Environmental Policies and Legislations: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Forest (conservation) Act, 1980. Wildlife Protection Act.		

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12th Edition, 2015

REFERENCE BOOKS

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

WEB REFERENCES

1. https://www.britannica.com/science/ecosystem
2. https://ocw.mit.edu/resources/#EnvironmentandSustainability

E -TEXT BOOKS

1. P N Palanisamy Environmental Science ISBN:9788131773253, eISBN:97899332509771 Edition: Second edition
2. Environmental Studies. Author, Dr. J. P. Sharma. Publisher, Laxmi Publications, 2009 ISBN, 8131806413, 9788131806418.

MOOCS COURSES

1. https://nptel.ac.in/courses/122103039/38
2. https://nptel.ac.in/courses/106105151/12

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

R PROGRAMMING

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS301PC	B. Tech	2	0	0	2	30	70	100

COURSE OBJECTIVES

To learn

1. Use R for statistical programming, computation, graphics, and modeling.
2. Write functions and use R in an efficient way.
3. Fit some basic types of statistical models.
4. Use R in their own research.
5. Be able to expand their knowledge of R on their own.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. List motivation for learning a programming language.
2. Access online resources for R and import new function packages into the R workspace.
3. Import, review, manipulate and summarize data-sets in R.
4. Explore data-sets to create testable hypotheses and identify appropriate statistical tests.
5. Perform appropriate statistical tests using R Create and edit visualization.

UNIT-I	INTRODUCTION	Classes: 12

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

UNIT-II	STRUCTURES, CONTROLSTATEMENTS, LOOPS	Classes: 14

R Programming Structures, Control Statements, Loops, - Looping Over Non-Vector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quick sort Implementation-Extended Example: A Binary Search Tree.

UNIT-III	SIMULATION IN R	Classes: 13

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability-Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices,

Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /output, Accessing the Keyboard and Monitor, Reading and writer Files.		
UNIT-IV	**GRAPHS & PROBABILITY DISTRIBUTIONS**	**Classes: 11**
Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files. Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.		
UNIT-V	**LINEAR MODELS**	**Classes: 11**
Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models- Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests.		

TEXT BOOKS

1. The Art of R Programming, A K Verma, Edition 1, Cengage Learning Publishers
2. R for Everyone, Lander, Edition 2, Pearson Publishers.
3. The Art of R Programming, Norman Mat loff, Edition 1, No Starch Press Publishers.

REFERENCE BOOKS

1. R Cookbook, Paul Teetor, Edition 1, Oreilly media Publishers.
2. R in Action, Rob Kabacoff, Edition 2, Manning Publishers.

WEB REFERENCES

1. https://www.rstudio.com/online-learning/
2. https://www.statmethods.net/
3. https://nptel.ac.in/courses/111104100/
4. https://ocw.mit.edu/search/ocwsearch.htm?q=R-programming

E -TEXT BOOKS

1. https://www.eduonix.com › r-programming-for-beginners-ebook

MOOCS COURSES

1. https://www.mooc-list.com › tags › r-programming
2. https://www.edx.org/learn/r-programming

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

COMPUTER ORIENTED STATISTICAL METHODS

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
MA302BS	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. The ideas of random variables and various discrete and continuous Probability Distributions and their properties.
2. The basic ideas of statistics including measures of central tendency.
3. The statistical methods of studying data samples.
4. The idea of Characteristics of queuing system.
5. The idea of Classification of Random processes.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. After learning the contents of this paper the student must be able to Formulate and solve problems involving random variables and apply statistical methods for Analyzing experimental data.
2. Students can solve estimation problems.
3. Students can able to understand the concept of hypothesis.
4. Students able to solve pure Birth-Death process problems.
6. After learning the contents of this paper the student must be able to solve examples of Markov chains, stochastic matrix.

UNIT-I	RANDOM VARIABLE AND DISTRIBUTIONS	Classes: 12

Random variables: Discrete and continuous random variables, Expectation of Random Variables, Variance of random variables, Binomial, Poisson, evaluation of statistical parameters for these distributions. Continuous random variables and their properties, distribution functions and densities, Normal distributions.

UNIT-II	SAMPLING DISTRIBUTION AND ESTIMATION	Classes: 12

Population and samples, Sampling Distribution of mean, Proportions, difference of means, Estimation: Point and Interval, Bayesian estimations.

UNIT-III	TESTING OF HYPOTHESIS	Classes: 10

Structure of a queuing system, Operating Characteristics of queuing system –Transient and steady states, Terminology of Queuing systems ,Arrival and service process-pure Birth-Death process Deterministic queuing models-M/M/1 Model of infinite queue M/M/1 model of finite queue.

UNIT-IV	QUEUING THEORY	Classes: 12
Structure of a queuing system, Operating Characteristics of queuing system –Transient and steady states, Terminology of Queuing systems ,Arrival and service process-pure Birth-Death process Deterministic queuing models-M/M/1 Model of infinite queue M/M/1 model of finite queue.		
UNIT-V	**STOCHASTIC PROCESS**	**Classes: 12**
Introduction to Stochastic Processes-Classification of Random processes, Methods of description of random processes, stationary and non stationary random processes, average values of single random process and two or more random processes. Markov process, Markova chain, classification of states – examples of Markova chains, stochastic matrix.		

TEXT BOOKS

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, keying Ye, Probability and statistics for engineers and scientists, 9th Edition, Pearson Publication.
2. Fundamentals of Mathematical Statistics, Khanna Publications, S C Guptha and V.K. Kapoor
3. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

REFERENCE BOOKS

1. T.T. Soong, Fundamentals of Probability And Statistics For Engineers, John Wiley & Sons Ltd, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, Academic Press.

WEB REFERENCES

1. https://www.efunda.com/math/gamma/index.cfm
2. https://ocw.mit.edu/resources/#Mathematics
3. https://www.sosmath.com/
4. https://www.mathworld.wolfram.com/

E -TEXT BOOKS

1. https://www.e-booksdirectory.com/listing.php?category=4
2. https://www.e-booksdirectory.com/details.php?ebook=10830

MOOCS COURSES

1. https://swayam.gov.in/
2. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

COMPUTER ORGANIZATION AND ARCHITECTURE

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS303PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. The ideas of random variables and various discrete and continuous Probability Distributions and their properties.
2. The basic ideas of statistics including measures of central tendency.
3. The statistical methods of studying data samples.
4. The idea of Characteristics of queuing system.
5. The idea of Classification of Random processes.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To Apply Knowledge of The Processor's Internal Registers and Operations.
2. Understand The Basics Structure of Computers, Operations and Instructions.
3. Design Arithmetic and Logic Unit.
4. Understand Pipelined Execution and Design Control Unit.
5. Understand Parallel Processing Architectures.
6. Understand The Various Memory Systems and I/O Communication.

UNIT-I	BASICS OF DIGITAL ELECTRONICS	Classes: 14

Review of Basics of Digital Electronics: Logic Gates, Boolean Algebra, Flip Flops (SR, JK, D, T), Registers, Half Adder, Full Adder, Multiplexer, Demultiplexer, Decoder, and Encoder. Data Representation: Number Systems–Decimal, Octal, Hexadecimal, Complement–(r-1)'s Complement, r's complement, Fixed Point Representation, Floating Point Representation, Gray Code, Decimal Codes. Digital Computers: Introduction, Block Diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture.

UNIT-II	REGISTER TRANSFER AND MICRO-OPERATIONS	Classes: 13

Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers – Three State Bus Buffers, Arithmetic Micro-Operations – Binary Adder, Binary Adder-Subtractor, Binary Incrementer, Arithmetic Circuit, Logic Micro-Operations and Its Hardware Implementation, Shift Micro-Operations and Hardware Implementation, Arithmetic Logic Shift Unit. Basic Computer Organization and Design: Instruction Codes, Stored Program Organization, Computer Registers, Common Bus System, Computer Instructions, Instruction Cycle, Memory Reference Instructions, Input Output and Interrupt.

UNIT-III	CPU & MICRO PROGRAMMED CONTROL	Classes: 12
Central Processing Unit: General Register Organization, Control Word, Stack Organization, Instruction Formats – Three Address, Two Address, One Address, Zero Address Instructions, Addressing Modes, Data Transfer And Manipulation, Arithmetic, Logical, Bit Manipulation, Program Control, Reduced Instruction Set Computer (RISC), CISC Characteristics. Micro programmed Control: Control Memory, Address Sequencing, Micro Program Example, Micro Program Sequencer.		
UNIT-IV	**INPUT-OUTPUT ORGANIZATION**	**Classes: 11**
Input-Output Organization: Input Output Interface, I/O Bus And Interface Modules, I/O Vs Memory Bus, Isolated Vs Memory Mapped I/O. Asynchronous Data Transfer, Handshaking, Programmed I/O, Interrupt-Initiated I/O**,** Priority Interrupt – Daisy Chaining, Parallel Priority, Priority Encoder, Interrupt Cycle, DMA Controller And Transfer.		
UNIT-V	**COMPUTER ARITHMETIC & MEMORY ORGANIZATION**	**Classes: 11**
Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. **Pipeline and Vector Processing:** Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processor. **Multi Processors:** Characteristics of Multiprocessors, Interconnection Structures, Interprocessor arbitration, Interprocessor communication and synchronization, Cache Coherence. RAM Chip, ROM Chips, Memory Address Map, Associative Memory, Cache Memory, Virtual Memory.		

TEXT BOOKS

1. Computer System Architecture – M. Moris Mano, Third Edition, Pearson/PHI.

REFERENCE BOOKS

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI.
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition, PHI/Pearson

WEB REFERENCES

1. "Computer Organization and Design: The Hardware/Software Interface" by David A Patterson and John L Hennessy
2. "Computer Organization" by Zvonco Vranesic and Safwat Zaky.
3. "Computer Architecture and Organization" by John P Hayes.

E -TEXT BOOKS

1. Fundamentals of Computer organization and Design by Shivarama Dandamudi
2. Computer Architecture: Complexity and Correctness by Mueller and Paul

MOOCS COURSES
1. https://www.mooc-list.com › tags › computer-architecture 2. https://www.edx.org › course › computation-structures-3-computer-mitx-6

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATA STRUCTURES USING C

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS304PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

1. To learn Exploring basic data structures such as stacks and queues and linked list.
2. Introduces a variety of data structures such as Dictionary, hash tables, search trees, tries, heaps, graphs.
3. Introduces sorting and pattern matching algorithms

COURSE OUTCOMES

1. Upon successful completion of the course, the student is able to
2. Ability to select the data structures that efficiently model the information in a problem.
3. Ability to assess efficiency trade-offs among different data structure implementations.
4. Implement and know the application of algorithms for sorting and pattern matching.
5. Design programs using a variety of data structures, including hash tables, binary and general Tree structures, search trees, tries, heaps, graphs, and AVL-trees..

UNIT-I	INTRODUCTION TO DATA STRUCTURES	Classes: 13

Introduction to Data Structures: Abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Double & Circular linked list implementations, Stack ADT & Stacks-Operations, array and linked representations of stacks & applications, Queue ADT & Queues-operations, array and linked representations, types of Queue, Applications of Queue.

UNIT-II	DICTIONARIES	Classes: 12

Dictionaries: linear list representation, skip list representation, operations - insertion, deletion and searching. Hash Table Representation: hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, and rehashing, and extendible hashing. Applications of Dictionary Data structures.

UNIT-III	SEARCH TREES	Classes: 10

Non-linear data structures tree, Binary trees, representations ,traversals and implementations, Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Rotations, Operations – Insertion, Deletion and Searching, Red –Black, Splay Trees.

Introduction to Red –Black trees and Splay Trees, B-Trees-B-Tree of order m, height of a B-Tree, insertion, deletion and searching, Comparison of Search Trees

UNIT-IV	GRAPHS	Classes: 11
Graphs: Definition & terminologies, types of graph, Graph implementation methods, Graph traversal Methods. Sorting: Insertion sort, Selection sort, Quick sort, Bucket sort, Heap Sort, External Sorting- Model for external sorting, Merge Sort.		
UNIT-V	**PATTERN MATCHING AND TRIES**	**Classes: 12**
Pattern Matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries		

TEXT BOOKS

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

REFERENCE BOOKS

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning

WEB REFERENCES

1. https://learntocodewith.me/posts/data-structures/
2. http://cgm.cs.mcgill.ca/~godfried/teaching/algorithms-web.html
3. https://www.javatpoint.com/data-structure-tutorial
4. https://www.geeksforgeeks.org/data-structures/

E -TEXT BOOKS

1. https://www.freetechbooks.com/algorithms-and-data-structures-f11.html
2. https://opendatastructures.org/

MOOCS COURSES

1. https://nptel.ac.in/courses/106102064/
2. https://swayam.gov.in/explorer?searchText=data+structures

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ANALOG AND DIGITAL ELECTRONICS

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS305ES	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Know the characteristics of various components.
2. Understand the utilization of components.
3. Design and analyze small signal amplifier circuits.
4. Learn Postulates of Boolean algebra and to minimize combinational functions
5. Design and analyze combinational and sequential circuits
6. Know about the logic families and realization of logic gates.

UNIT-I	DIODES AND APPLICATIONS	Classes: 14

Junction diode characteristics: Junction diode characteristics: Open circuited p-n junction, p-n junction as a rectifier, V-I characteristics, Effect of temperature, Diode resistance, Transition capacitance, Diffusion capacitance, Zener diode , Tunnel diode, Photo diode, LED.

Diode Applications - Clipping circuits, Comparators, Half wave rectifier, Full wave rectifier, Rectifier with capacitor filter.

UNIT-II	BIPOLAR JUNCTION TRANSISTORS	Classes: 13

Transistor characteristics: The junction transistor, transistor as an amplifier, BJT Operation, BJT Symbol, BJT Hybrid Model, Determination of h-parameters from Transistor Characteristics CB, CE, CC configurations, comparison of transistor configurations, the operating point, self-bias or Emitter bias, bias compensation, thermal runaway and stability.

UNIT-III	FETS AND DIGITAL CIRCUITS	Classes: 12

FETs: JFET, V-I characteristics, MOSFET, (Construction, principle of operation, symbol), Characteristics in Enhancement and Depletion modes.

Digital Circuits: Digital (binary) operations of a system, OR gate, AND gate, NOT, EXCLUSIVE OR gate, De Morgan Laws, NAND and NOR DTL & TTL gates, TTL output stages, RTL and DCTL, CMOS, Comparison of logic families.

UNIT-IV	COMBINATIONAL LOGIC CIRCUITS	Classes: 11

Basic Theorems and Properties of Boolean algebra, Canonical and Standard Forms, Digital Logic Gates, The Map Method, Product-of-Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Exclusive-OR Function, Binary Adder-Subtractor, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexer.

UNIT-V	SEQUENTIAL LOGIC CIRCUITS	Classes: 10

Sequential Circuits, Storage Elements: Latches and flip flops, Design of Clocked Sequential Circuits, State Reduction and Assignment, Shift Registers, Ripple Counters, Synchronous Counters, Random-Access Memory, Read-Only Memory.

TEXT BOOKS

1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman,
2. Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010.
3. Digital Design, 5/e, Morris Mano and Michael D. Cilette, Pearson, 2011

REFERENCE BOOKS

1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988.
2. Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series, 1994.

WEB REFERENCES

1. Analog Electronics Authors- L.K. MAHESWARI, M.M.S.ANAND. 2009
2. Electronic Communication System Author- Kennedy
3. Integrated Electronics Analog And Digital & System Author – Jacob Millman. Christos C. Halkias
4. https://www.analog.com › education › education-library › tutorials

E -TEXT BOOKS

1. The Scientist & Engineer's Guide to Digital Signal Processing, 1999
2. Application-Specific Integrated Circuits Michael J. Smith

MOOCS COURSES

1. https://www.mooc-list.com › tags › analogue-electronics
2. https://www.mooc-list.com › course › electronic-systems-and-digital-electronics

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

R PROGRAMMING LAB

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS306PC	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

To learn

1. To provide an overview of a new language R used for data science.
2. To introduce students to the R programming environment and related eco-system and thus provide them with an in demand skill-set, in both the research and business environments.
3. To introduce the extended R ecosystem of libraries and packages.
4. To demonstrate usage of as standard Programming Language.
5. To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R.
6. To enable students to use R.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Install and use R for simple programming tasks.
2. Extend the functionality of R by using add-on packages
3. Extract data from files and other sources and perform various data manipulation tasks on them.
4. Code statistical functions in R.
5. Use R Graphics and Tables to visualize results of various statistical operations on data.
6. Apply the knowledge of R gained to data Analytics for real life applications.

LIST OF EXPERIMENTS

1. Introduction to R and R Studio and Installation.
2. R Programming on Basic Concepts
3. R Programming on Array
4. R Programming on Data frame
5. R Programming on Matrix
6. R Programming on Vector
7. R Programming on List
8. R Programming on Factor
9. R Programming on Graphs
10. R Programming on Distribution
11. R Programming on Regression

TEXT BOOKS

1. Thomas Rahlf. Data Visualisation with R. Springer International Publishing, New York, 2017. ISBN 978-3-319-49750-1.
2. Lawrence Leemis. Learning Base R. Lightning Source, 2016. ISBN 978-0-9829174-80.

REFERENCE BOOKS

1. https://www.w3resource.com/r-programming-exercises/
2. http://web.math.ku.dk/~helle/R-intro/exercises.pdf
3. https://www.westernsydney.edu.au/_data/assets/pdf_file/0011/862346/Rnotes_solutions_20180905.pdf.

WEB REFERENCES

1. R Programming for Beginners Paperback – 21 Jul 2017.

E -TEXT BOOKS

1. R For Beginners by Emmanuel Paradise.
2. R Inferno by Patrick Burns.

MOOCS COURSES

1. https://www.coursera.org › learn › r-programming
2. https://www.classcentral.com/course/open2study-chemistry-building-blocks-of-the-world-1297

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATA STRUCTURES LAB USING C

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS307PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. Exploring basic data structures such as stacks and queues and linked list.
2. Introduces a variety of data structures such as Dictionary, hash tables, search trees, tries, Heaps, graphs
3. Introduces sorting and pattern matching algorithms

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general Tree structures, search trees, tries, heaps, graphs, and AVL-trees.

LIST OF EXPERIMENTS

1. Write a program that uses functions to perform the following operations on singly linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal v) Display vi) Reversal of the list.
2. Write a program that uses functions to perform the following operations on doubly linked list. i) Creation ii) Insertion iii) Deletion iv) Traversal V) Display
3. Write a program that uses functions to perform the following operations on circular linked list. i) Creation ii) Insertion iii) Deletion iv) Traversal v) Display
4. Write a program that implement stack (its operations) using i) Arrays ii) linked list.
5. Write a program that implement Queue (its operations) using i) Arrays ii) Pointers.
6. Write a program that implement Circular Queue (its operations) using i) Arrays ii) Pointers
7. Write a program that implements the following sorting methods to sort a given list of integers in ascending order i) Bubble sort ii) Selection sort iii) Insertion sort
8. Write a program that uses both recursive and non recursive functions to perform the following searching operations for a Key value in a given list of integers:
   i) Linear search ii) Binary search
9. Write a program to implement pre order, in order and post order traversal

methods.
10. Write a program to implement i) DFS ii) BFS methods.

TEXT BOOKS

1 Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2 Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

REFERENCE BOOKS

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B.A. Forouzan, Cengage Learning.

WEB REFERENCES

1 https://www.javatpoint.com/singly-linked-list
2 https://www.programiz.com/dsa/circular-queue.

E -TEXT BOOKS

1. "Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles" by Narasimha Karumanchi.
2. Data Structures & Algorithms in Java, 2e by lafore

MOOCS COURSES

1 https://www.mooc-list.com/tags/data-structures
2 https://www.coursera.org/specializations/data-structures-algorithms

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ANALOG AND DIGITAL ELECTRONICS LAB

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EC308ES	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

To learn

1. To introduce components such as diodes, BJTs and FETs.
2. To know the applications of components.
3. To give understanding of various types of amplifier circuits
4. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
5. To understand the concepts of combinational logic circuits and sequential circuits.

COURSE OUTCOMES

1. Upon successful completion of the course, the student is able to
2. Know the characteristics of various components.
3. Understand the utilization of components.
4. Design and analyse small signal amplifier circuits.
5. Postulates of Boolean algebra and to minimize combinational functions
6. Design and analyse combinational and sequential circuits
7. Known about the logic families and realization of logic gates.

LIST OF EXPERIMENTS

1. Forward & Reverse Bias Characteristics of PN Junction Diode.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filters
4. Common Emitter Amplifier Characteristics
5. Common Base Amplifier Characteristics
6. Common Source amplifier Characteristics
7. Realization of Boolean Expressions using Gates
8. Design and realization logic gates using universal gates
9. Generation of clock using NAND / NOR gates
10. Design a 4 – bit Adder / Subtractor
11. Design and realization a Synchronous and Asynchronous counter using flip-flops
12. Realization of logic gates using DTL, TTL, ECL, etc.

TEXT BOOKS
1. Integrated Electronics: Analog and Digital Circuits and Systems, 2/e, Jaccob Millman, Christos Halkias and Chethan D. Parikh, Tata McGraw-Hill Education, India, 2010. 2. Digital Design, 5/e, Morris Mano and Michael D. Cilette, Pearson, 2011.
REFERENCE BOOKS
1. Electronic Devices and Circuits, Jimmy J Cathey, Schaum's outline series, 1988. 2. Digital Principles, 3/e, Roger L. Tokheim, Schaum's outline series, 1994.
WEB REFERENCES
1. Hands-On Electronics: A Practical Introduction to Analog and Digital Circuits by Daniel M. aplan and Christopher G. White | 15 May 2003 2. Foundations of Analog and Digital Electronic Circuits by Agarwal | 24 September 2005
E -TEXT BOOKS
1. https://www.analog.com/en/education/education-library/tutorials.html 2. "Analysis and Design of Digital Integrated Circuits" by D A Hodges and H G Jackson
MOOCS COURSES
1. https://www.mooc-list.com/tags/digital-electronics 2. https://www.coursera.org/courses?query=electronics

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

IT WORKSHOP LAB

II B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS309PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. To nurture the students to identify the basic components of a computer.
2. To demonstrate the process of assembling and disassembling of computer parts.
3. To explain the installation of operating systems.
4. To make the students develop applications like spread sheet, documents, presentation using the software like MS office, LATEX.
5. To illustrate the usage of internet.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Identify various components and its functions.
2. Apply the knowledge of computer peripherals in assembling, disassembling and
3. Troubleshooting of personal computer.
4. Experiment with installation of operating system and make the computer ready to use.
5. Prepare word documents; excel sheets and power point presentation.
6. Develop LaTex documents to handling equations and images effectively and make use of internet to enhance their technical skills.

LIST OF EXPERIMENTS

1. Identification of peripherals of a computer: Block diagram of the CPU along with the configuration of the each peripheral and its functions.
2. System Assembling and Disassembling: Disassembling the components of a PC and assemble them back to working condition.
3. Installation of softwares: Installation of operating Systems: Windows, Linux along with necessary Device Drivers, Installation of application softwares and Tools.
4. Troubleshooting (Demonstration): Hardware Troubleshooting: Identification of a problem and fixing a defective PC Software Troubleshooting: Identification of a problem and fixing the PC for any software issues.
5. Network Configuration and Internet: Configuring TCP/IP, proxy and firewall settings, Internet and World Wide Web-Search Engines, Types of search engines, netiquette, and cyber hygiene.
6. MS-Office / Open Office :
    a. Word - Formatting, Page Borders, Reviewing, Equations, symbols.
    b. Spread Sheet - organize data, usage of formula, graphs and charts.
    c. Power point - features of power point, guidelines for preparing an effective

Presentation.

d. Access- creation of database, validate data.

7. LaTeX : LaTeX - basic formatting, handling equations and images.

TEXT BOOKS

1. Textbook Of Workshop Technology Rs Khurmi Jk Gupta,

REFERENCE BOOKS

1. Computer Hardware, Installation, Interfacing, Troubleshooting And Maintenance, K.L. James,Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts And Techniques, Windows XP Edition By Gary B. Shelly, Misty E. Vermaat And Thomas J. Cashman (2007, Paperback).

WEB REFERENCES

1. LATEX- User's Guide and Reference Manual, Leslie Lamport, Pearson, Second Edition LPE.

E -TEXT BOOKS

1. Foundations of Information Technology Coursebook 9: Windows 7 and MS Office 2007 (With MS Office 2010 Updates)-Sangeeta Panchal,Alka Sabharwal
2. Dell Ms Office 2003-Diane Koers

MOOCS COURSES

1. https://store.self-publish.in › products › a-textbook-of-workshop-technology

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

OPERATING SYSTEMS

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS401PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn
1. To understand the OS role in the overall computer system
2. To study the operations performed by OS as a resource manager
3. To understand the scheduling policies of OS
4. To understand the different memory management techniques
5. To understand process concurrency and synchronization
6. To understand the concepts of input/output, storage and file management
7. To understand the goals and principles of protection

COURSE OUTCOMES

Upon successful completion of the course, the student is able to
1. Apply optimization techniques for the improvement of system performance.
2. Ability to design and solve synchronization problems.
3. Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput by keeping CPU as busy as possible.
4. Ability to change access controls to protect files.
5. Ability to compare the different operating systems

UNIT-I	INTRODUCTION TO OPERATING SYSTEM	Classes: 12

Operating System - Introduction, Structures - Simple Batch, Multi programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls

UNIT-II	PROCESS AND CPU SCHEDULING	Classes: 14

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, and Interposes Communication, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.
System call interface for process management-fork, exit, wait, waitpid, exec.

UNIT-III	DEADLOCKS	Classes: 11

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock
Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

Interposes Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.		
UNIT-IV	**MEMORY MANAGEMENT AND VIRTUAL MEMORY**	**Classes: 12**
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.		
UNIT-V	**FILE SYSTEM INTERFACE AND OPERATIONS**	**Classes: 13**
File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls. Case Study-Linux: Linux History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Inter-process Communication.		

TEXT BOOKS

1. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin, Greg Gagne, 9th Edition, Wiley, 2016 India Edition

REFERENCE BOOKS

1. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI
2. Operating Systems: A concept-based Approach, 2nd Edition, D.M. Dhamdhere, TMH.
3. Principles of Operating Systems, B. L. Stuart, Cengage learning, India Edition.
4. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
5. Principles of Operating systems, Naresh Chauhan, Oxford University Press

WEB REFERENCES

1. Operating System Principles by Silberschatz, Galvin, Gagne
2. Operating Systems: Internals and Design Principles, 7e by Stallings

E -TEXT BOOKS

1. http://www.freebookcentre.net/ComputerScience-Books-Download/Operating-Systems-and-Middleware-Supporting-Controlled-Interaction.html
2. http://www.freebookcentre.net/ComputerScience-Books-Download/Operating-System-by-Gopi-Sanghani.html

MOOCS COURSES

1. https://www.mooc-list.com/tags/os
2. https://nptel.ac.in/courses/106106144/2

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

PYTHON PROGRAMMING

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS402PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. Learn Syntax and Semantics and create Functions in Python.
2. Understand Lists, Dictionaries and Regular expressions in Python.
3. Handle Strings and Files in Python.
4. Implement Object Oriented Programming and graphics concepts in Python.
5. Build GUI Application Programming in Python.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming and graphics as used in Python.
5. Implement exemplary applications related to GUI in Python.

UNIT-I	INTRODUCTION TO PYTHON	Classes: 13

Introduction to Python: Installing Python. How a Program Works, Using Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output. Decision Structures and Boolean Logic: if, if-else, if-elseif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables. Repetition Structures: Introduction, while-loop, for loop, Calculating a Running Total, Input Validation Loops, Nested Loops.

UNIT-II	DATA TYPES AND EXPRESSIONS	Classes: 12

Data types and Expressions: Strings, Assignment and Comments, Numeric Data Types and Character Sets, Expressions, Functions and Modules.
Lists, Tuples, Dictionaries: Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT-III	DESIGN WITH CLASSES, FILES AND EXCEPTIONS	Classes: 12

Design with Classes: Classes and Objects, Classes and Functions, Classes and Methods, Working with Instances, Inheritance and Polymorphism. Object-Oriented Programming: Procedural and Object-Oriented Programming, Classes, techniques for Designing Classes.
Files: Text files, reading and writing files; command line arguments, Illustrative programs: word count, copy file.
Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions.

UNIT-IV	EXPRESSIONS AND MULTITHREADING	Classes: 12

Regular Expressions: Introduction, Special Symbols and Characters, Res and Python
Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules.

UNIT-V	GRAPHICS AND GUI INTERFACES	Classes: 12

Simple Graphics and Image Processing: Overview of Turtle Graphics, Two dimensional Shapes, Colors and RBG System, Image Processing.
Graphical User Interfaces: Coding simple GUI-based programs, other useful GUI resources.
GUI Programming: Graphical User Interfaces, Using the tkinter Module**,** Display text with Label Widgets, Organizing Widgets with Frames, Button Widgets and Info Dialog Boxes, Getting Input with Entry Widget, Using Labels as Output Fields, Radio Buttons, Check Buttons.

TEXT BOOKS

1. A Practical Introduction to Python Programming, Brian Heinold.
2. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
3. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning.
4. Think Python First Edition, by Allen B. Downey, Orielly publishing.

REFERENCE BOOKS

1. Introduction to Computation and Programming Using Python. John V. Guttag, the MIT Press.
2. James Payne, Beginning Python using Python 2.6 and Python 3, Wrox publishing.
3. Paul Gries, Practical Programming: An Introduction to Computer Science using Python, The Pragmatic Bookshelf, 2nd edition (4 Oct. 2013).
4. Charles Dierach, Introduction to Computer Science using Python.

WEB REFERENCES

1. https://swayam.gov.in/nd1_noc19_cs41/preview
2. https://swayam.gov.in/nd1_noc19_mg47/preview
3. https://swayam.gov.in/nd1_noc19_cs40/preview

E -TEXT BOOKS

1. https://www.tutorialspoint.com/python3/

2. https://www.youtube.com/watch?v=Dl_dz1FOvcY&list=PLHT9VxUGxZRshJ-edzjLZ72HfSta8s5f
3. https://www.udemy.com/machine-learning-using-r-and-python/
4. https://www.udemy.com/r-programming-language/
5. https://www.simpliv.com/itcertification/data-analytics-using-r-programming
6. https://books.goalkicker.com/PythonBook/

MOOCS COURSES

1. https://www.coursera.org/learn/python-programming
2. https://www.edx.org/professional-certificate/python-data-science
3. https://www.edx.org/course/cs50s-web-programming-with-python-and-javascript
4. https://www.programiz.com/python-programming/regex
5. https://www.tutorialspoint.com/python3/
6. https://www.geeksforgeeks.org/cgi-programming-python/
7. https://realpython.com/python-beginner-tips/
8. https://www.python.org/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

JAVA PROGRAMMING

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS403PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. Language programming using a module's approach which gives emphasize to small programs.
2. To define exceptions and use I/O streams.
3. To introduce the design of Graphical User Interface using applets and swing controls.
4. To develop a java application with threads and generics classes.
5. To design and build simple Graphical User Interface.
6. Learn how to write moderately complex Java programs efficiently.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Knowing essential concepts, principles and theories of Java technology relating to the web applications.
2. Develop real-world programming problems and applications efficiently using the advanced JAVA library.
3. Develop Java applications with threads and generics classes.
4. Able to develop multithreaded applications with synchronization and applets for web applications.
5. Build Java applications using exceptions and I/O streams and interactive Java programs using swings.

UNIT-I	OBJECT-ORIENTED THINKING AND INHERITANCE	Classes: 13

Object-Oriented Thinking- A way of viewing world – Agents and Communities, messages and methods, Responsibilities, Classes and Instances, Class Hierarchies- Inheritance, Method binding, Overriding and Exceptions, Summary of Object-Oriented concepts. Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes, Methods and Classes, String handling.

Inheritance– Inheritance concept, Inheritance basics, Member access, Constructors, Creating Multilevel hierarchy, super uses, using final with inheritance, Polymorphism-ad hoc polymorphism, pure polymorphism, method overriding, abstract classes, Object class, forms of inheritance-specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance

UNIT-II	PACKAGES AND STREAM BASED I/O	Classes: 12

Packages - Defining a Package, CLASSPATH, Access protection, importing packages. Interfaces - defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, auto boxing, generics.

UNIT-III	EXCEPTION HANDLING AND GENERIC CLASSES	Classes: 12

Exception handling - Fundamentals of exception handling, Exception types, Termination or resumptive models, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes. Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads; inter thread communication

Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

UNIT-IV	COLLECTIONS FRAMEWORK AND INTERFACES	Classes: 12

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Accessing a Collection via an Iterator, Using an Iterator, The For-Each alternative, Map Interfaces and Classes, Comparators, Collection algorithms, Arrays, The Legacy Classes and Interfaces- Dictionary, Hashtable ,Properties, Stack, Vector More Utility classes, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

UNIT-V	GUI PROGRAMMING WITH SWING	Classes: 13

GUI Programming with Swing – Introduction, limitations of AWT, MVC architecture, components, containers. Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout. Event Handling- The Delegation event model-Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events, Adapter classes, Inner classes, Anonymous Inner classes.

A Simple Swing Application, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets. Creating a Swing Applet, Painting in Swing, A Paint example, Exploring Swing Controls- JLabel and Image Icon, JText Field, The Swing Buttons-JButton, JToggle Button, JCheck Box, JRadio Button, JTabbed Pane, JScroll Pane, JList, JCombo Box, Swing Menus, Dialogs.

TEXT BOOKS

1. Java The complete reference, 11th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd, 2018.
2. Cay S. Horstmann, Gary cornell, ―Core Java Volume –I Fundamentals‖, 11th Edition, Prentice Hall, 2018.Think Python First Edition, by Allen B. Downey, Orielly publishing.

REFERENCE BOOKS

1. Steven Holzner, ―Java 2 Black book‖, Dreamtech press, 2011.
2. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
3. Timothy Budd, ―Understanding Object-oriented programming with Java,

Updated Edition, Pearson Education, 2000.

4. Java Programming and Object-oriented Application Development, R. A. Johnson, Cengage Learning.

WEB REFERENCES

1. http://www.developer.com/icom_includes/feeds/developer/dev-25.xml
2. http://www.ibm.com/developerworks/views/java/rss/libraryview.jsp
3. http://www.javaworld.com/rss/index.html
4. http://feeds.feedburner.com/DevxLatestJavaArticles

E -TEXT BOOKS

1. HTTP Programming Recipes for Java Bots by Jeff Heaton - Heaton Research, Inc.
2. Java Distributed Computing by Jim Farley - O'Reilly Media
3. Java Precisely by Peter Sestoft - IT University of Copenhagen
4. Java for Absolute Beginners: Learn to Program the Fundamentals the Java 9+ Way
5. Fundamentals of the Java Programming Language, Java SE 6
6. JAVA: Easy Java Programming for Beginners, Your Step-By-Step Guide to Learning Java Programming
7. Android App Development in Android Studio: Java+Android Edition for Beginners

MOOCS COURSES

1. https://www.mooc-list.com › tags › java-programming
2. https://www.mooc-list.com › tags › java
3. https://www.edx.org › learn › java
4. https://www.quora.com › What-are-the-best-MOOCs-for-learning-Java
5. https://www.udacity.com › course › java-programming-basics--ud282
6. https://www.futurelearn.com › courses › begin-programming.

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

BUSINESS ECONOMICS AND FINANACIAL ANALYSIS

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
HS404MS	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To learn the basic Business types, impact of the Economy on Business and Firms specifically.
2. To analyze the Business from the Financial Perspective.
3. To Plan production and cost concepts for maximizing profit.
4. To construct financial statement in accordance with generally accepted accounting Principles.
5. To analyze the financial performance of business through Ratios.
6. To Estimate investment proposals through Capital Budgeting Methods.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand Business with the use of economic theories and business structure.
2. Learn Production and cost concepts for maximizing profit.
3. Construct financial statement in accordance with generally accepted accounting principles.
4. Analyze the Financial performance of business through Ratios.
5. Estimate investment proposals through Capital Budgeting Methods

UNIT-I	INTRODUCTION TO BUSINESS AND ECONOMICS	Classes: 13

Business: Characteristic features of Business, Features and evaluation of Private Enterprises and Public Enterprises. Economics: Significance of Economics, types, Concepts and Importance of National Income, Inflation, Nature and Scope of Business Economics. Demand Analysis: Demand Definition, Types, Demand Function, Law of Demand, Elasticity of Demand, Types, Demand Forecasting Methods.

UNIT-II	PACKAGES AND FILE HANDLING	Classes: 13

Theory of Production and Cost Analysis: Theory of Production: Factors of Production, Production Function, Production Function with one variable input, two variable inputs (ISO Quants and ISO Costs), Scale of Production with Law of Returns, Cobb-Douglas Production Function.

Cost Analysis: Types of Costs, Short run and Long run Cost Functions, Break Even Analysis.

UNIT-III	MARKET STRUCTURES, PRICING & FINANCIAL ACCOUNTING	Classes: 12

Market Structures, Pricing & Financial Accounting: Market Structures, Pricing: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition, Types of Pricing. Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, and Preparation of Final Accounts.

UNIT-IV	FINANCIAL ANALYSIS THROUGH RATIOS	Classes: 11

Financial Analysis Through Ratios : Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Capital Structure Ratios and Profitability Ratios, (simple problems), Cash Flow Statement (simple problems) and Funds Flow Statement (simple problems)

UNIT-V	CAPITAL BUDGETING	Classes: 10

Capital, significance, Types of Capital, Methods and sources of raising finance. Nature of Capital Budgeting, features of Capital Budgeting proposals, Methods of Capital Budgeting: Pay Back Period Method (PBP), Accounting Rate of Return (ARR), Net Present Value Method (NPV) simple problems.

TEXT BOOKS

1. D. D. Chaturvedi, S. L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting, Tata Mc –Graw Hill, 2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd. 2012.

REFERENCE BOOKS

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press, 2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, Financial Accounting, 5e, Vikas Publications, 2013

WEB REFERENCES

1. https://nptel.ac.in/courses/110106050/17
2. https://nptel.ac.in/courses/110106050/39
3. https://nptel.ac.in/courses/110106050/38

E -TEXT BOOKS

1. https://www.sciencedirect.com/book/9780750644549/business-economics
2. http://www.freebookcentre.net/Business/Economics-Books.html

MOOCS COURSES

1. https://nptel.ac.in/courses/110106050/
2. https://nptel.ac.in/courses/110106050/11

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

DISCRETE MATHEMATICS

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS405PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Introduces the elementary discrete mathematics for computer science and engineering.
2. Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, Permutations and combinations, counting principles; recurrence relations and generating functions.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand and construct precise mathematical proofs.
2. Ability to use logic and set theory to formulate precise statements.
3. Ability to analyze and solve counting problems on finite and discrete structures.
4. Ability to describe and manipulate sequences.
5. Ability to apply graph theory in solving computing problems.

UNIT-I	INTRODUCTION TO BUSINESS AND ECONOMICS	Classes: 11

The Foundations: Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT-II	SET'S, FUNCTIONS AND SEQUENCES	Classes: 12

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT-III	ALGORITHMS	Classes: 10

Algorithms, Induction and Recursion: Algorithms, The Growth of Functions, Complexity of Algorithms Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT-IV	DISCRETE PROBABILITY AND ADVANCED COUNTING	Classes: 11

Discrete Probability and Advanced Counting Techniques: An Introduction to Discrete Probability, Probability Theory, Bayes' Theorem, Expected Value and Variance Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Generating functions, function of sequence, Calculating Coefficients of generating functions.

UNIT-V	GRAPHS	Classes: 12

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring. Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

TEXT BOOKS

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory-Kenneth H Rosen, 7th Edition, TMH.

REFERENCE BOOKS

1. Discrete Mathematical Structures with Applications to Computer Science-J.P. Tremblay and R. Manohar, TMH.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe L. Mott, Abraham. Kandel, Teodore P. Baker, 2nd ed, Pearson Education.
3. Discrete Mathematics- Richard Johnsonbaugh, 7Th Edn., Pearson Education.
4. Discrete Mathematics with Graph Theory- Edgar G. Goodaire, Michael M. Parmenter.
5. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.

WEB REFERENCES

1. "Discrete Mathematics and its Applications" by Kenneth H Rosen
2. "Elements of Discrete Mathematics" by C L Liu
3. "Discrete Mathematics" by Norman L Biggs
4. "Discrete Mathematics for Computer Science" by Kenneth Bogart and Robert L Drysdale
5. "Discrete Mathematics with Applications" by Thomas Koshy
6. "Discrete Mathematics (Schaum's Outlines)" by Seymour Lipschutz and Marc Laras Lipson

E -TEXT BOOKS

1. Combinatorics And Graph Theory Sarkar, Bikash Kanti , Chakraborty, Swapan Ku Discrete Mathematics Chandrasekaran, N., Umaparvathi, M. Mar
2. Discrete Mathematics And Graph Theory Biswal, Purna Chandra
3. Advanced Discrete Mathematics Rajput, Uday Singh

MOOCS COURSES

1. https://www.mooc-list.com › tags › discrete-mathematics
2. https://www.mooc-list.com › tags › discrete-mathematics
3. https://www.mooc-list.com › course › discrete-mathematics-coursera
4. https://www.coursera.org › learn › discrete-mathematics

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

OPERATING SYSTEMS LAB

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS406PC	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

To learn

1. To understand the OS role in the overall computer system
2. To study the operations performed by OS as a resource manager
3. To understand the scheduling policies of OS
4. To understand the different memory management techniques
5. To understand process concurrency and synchronization
6. To understand the concepts of input/output, storage and file management
7. To understand the goals and principles of protection
8. Introduce system call interface for file and process management
9. To study different OS and compare their features.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Apply optimization techniques for the improvement of system performance.
2. Ability to design and solve synchronization problems.
3. Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput by keeping CPU as busy as possible.
4. Ability to change access controls to protect files.
5. Ability to compare the different operating systems

Recommended Systems/Software Requirements:

1. Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100MB free disk space.
2. Ubuntu OS

LIST OF EXPERIMENTS

1. Write C programs to simulate the following CPU Scheduling algorithms
   a) FCFS b) SJF c) Round Robin d) priority
2. Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, fcntl, seek, stat, opendir, readdir)
3. Write a C program to simulate Bankers Algorithm for Deadlock Avoidance and Prevention.
4. Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.
5. Write C programs to illustrate the following IPC mechanisms
   a) Pipes b) FIFOs c) Message Queues d) Shared Memory
6. Write C programs to simulate the following memory management techniques

a) Paging b) Segmentation

7. Write C programs to implement IPC between two process using
   a) Message Queues b) shared Memory
8. Write a C program to simulate multilevel Queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system process and user process. System processes are to be given higher priority than user processes. Use FCFS scheduling for the process in each queue.

TEXT BOOKS

1. An Introduction to Operating Systems, P.C.P Bhatt, 2nd edition, PHI.
2. Unix System Programming Using C++, Terrence Chan, PHI/Pearson.
3. Modern Operating Systems, Andrew S Tanenbaum, 3rd Edition, PHI

REFERENCE BOOKS

1. "Arch "Data Integrity in Pharmaceutical and Medical Devices Regulation Operations: Best Practices Guide to Electronic Records Compliance" by Orlando Lopez itecting the Internet of Things" by Dieter Uckelmann and Mark Harrison

WEB REFERENCES

1. "TestFrame: An Approach to Structured Testing" by Chris C Schotanus
2. "Logistic Core Operations with SAP: Inventory Management, Warehousing, Transportation, and Compliance" by Jens Kappauf and Bernd Lauterbach
3. "Supply Chain Management Based on SAP Systems: Order Management in Manufacturing Companies (SAP Excellence)" by Gerhard F Knolmayer and Peter Mertens

E -TEXT BOOKS

1. Operating System: From 0 to 1 by Tu, Do Hoang - Github , 2017
2. Operating Systems Tata McGraw-Hill E
3. Introducing Windows 8: An Overview for IT Professionals by Jerry Honeycutt - Microsoft Press , 2012 education, 1997
4. Microsoft Windows Server System Deployment Guide for Midsize Businesses - Microsoft Press , 2005

MOOCS COURSES

1. https://www.classcentral.com › tag › operating-systems
2. https://www.my-mooc.com › mooc › introduction-to-operating-systems--u.
3. https://www.computersciencezone.org › computer-science-education-free-.
4. https://www.classcentral.com › tag › operating-systems.

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

PYTHON PROGRAMMING LAB

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS407PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. To write, test, and debug simple Python programs.
2. To implement Python pattern programs with conditionals and loops.
3. Use functions for structuring Python programs, Read and write data from/to files in Python.
4. To represent compound data using Python lists, tuples, and dictionaries.
5. To design Gaming.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Write, test, and debug simple Python programs.
2. Implement Python pattern programs with conditionals and loops.
3. Develop Python programs step-wise by defining functions and calling them, Read and write data from/to files in Python.
4. Use Python lists, tuples, dictionaries for representing compound data.
5. Design a gaming.

LIST OF EXPERIMENTS

1. Write a python program to compute the GCD of two numbers.
2. Write a python program to find the square root of a number (Newton's method).
3. Write a python program to exponentiation (power of a number).
4. Write a python program to find the maximum of a list of numbers.
5. Write a python program to print a hollow diamond pattern.
6. Write a python program to print the arrow pattern.
7. Write a python program to print zigzag pattern.
8. (a). Write a python program for Linear search.
   (b). Write a python program for Binary search.
9. (a). Write a python program for Selection sort.
   (b). Write a python program for Insertion sort.
   (c). Write a python program for Merge sort.
10. Write a python program to find first n prime numbers.
11. Write a python program for multiply matrices.
12. Write a python program to take command line arguments (word count).
13. Write a python program to find the most frequent words in a text read from a file.
14. Write a python program to simulate elliptical orbits in Pygame.
15. Write a python program for simulate bouncing ball in Pygame.

TEXT BOOKS

1. A Practical Introduction to Python Programming, Brian Heinold.
2. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
3. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning. Think Python First Edition, by Allen B. Downey, Orielly publishing.

REFERENCE BOOKS

1. Learn Python in 1 Day: Complete Python Guide with Examples Kindle Edition
2. Python Crash Course Paperback – 8 Dec 2015 by Eric Matthes
3. Python Cookbook: Recipes for Mastering Python 33rd Edition, Kindle Edition

WEB REFERENCES

1. Python Programming (Edit): An Introduction to Computer Science Paperback– 7 May 2010
2. Programming Python 4e Paperback – 14 Jan 2011 by Mark Lutz
3. Introduction to Machine Learning with Python Paperback – 7 Oct 2016 by Andreas C. Mueller (Author), Sarah Guido

E -TEXT BOOKS

1. http://www.oreilly.com/programming/free/a-whirlwind-tour-of-python.csp
2. http://www.oreilly.com/programming/free/20-python-libraries-you-arent-using-but-should.csp
3. http://www.oreilly.com/programming/free/hadoop-with-python.csp
4. http://www.oreilly.com/programming/free/how-to-make-mistakes-in-python.csp

MOOCS COURSES

1. https://www.mooc-list.com › tags › python-programming
2. https://www.mooc-list.com › tags › python
3. https://www.edx.org › learn › python
4. https://www.udacity.com › course › introduction-to-python--ud1110

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

JAVA PROGRAMMING LAB

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS408PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. To build software development skills using java programming for real-world applications.
2. To understand and apply the concepts of classes, packages, interfaces, array list, exception handling and file processing.
3. To write programs using abstract classes.
4. To write programs for solving real world problems using java collection frame work and multithreaded programs.
5. To write GUI programs using swing controls in Java.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Able to write programs for solving real world problems using java collection frame work.
2. Able to write programs using abstract classes.
3. Able to write multithreaded programs.
4. Able to write GUI programs using swing controls in Java.

LIST OF EXPERIMENTS

1. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

3. a) Develop an applet in Java that displays a simple message.

b) Develop an applet in Java that receives an integer in one text field, and computes its factorial

Value and returns it in another text field, when the button named "Compute" is clicked.

4. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were

Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

5. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

6. Write a Java program for the following:

Create a doubly linked list of elements.

Delete a given element from the above list.

Display the contents of the list after deletion.

7. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in selected color. Initially, there is no message shown.

8. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

9. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Labels in Grid Layout.

10. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired (Use Adapter classes).

11. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

12. Write a Java program that correctly implements the producer – consumer problem using the concept of interthread communication.

13. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

14. Write a Java program that implements Quick sort algorithm for sorting a list of names in ascending order

15. Write a Java program that implements Bubble sort algorithm for sorting in descending order and also shows the number of interchanges occurred for the given set of integers.

16. Write a java program to design a registration form for creating a new eMail account.

TEXT BOOKS

1. Arnold Ken, Gosling J, "The Java Programming Language", Addison Wesley.
2. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
3. Thinking in Java, Bruce Eckel, Pearson Education.
4. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.

REFERENCE BOOKS

1. "The Java Programming Language" by Arnold
2. "Java: The Complete Reference" by Herbert Schildt
3. "Core Java: An Integrated Approach, New: Includes All Versions upto Java 8" by R Nageswara Rao and DT Editorial Services
4. "Java Programming Interviews Exposed (WROX)" by Noel Markham
5. "Advanced Java Programming" by Uttam Roy
6. "Cracking the C, C++ and Java Interview" by S G Ganesh and K U Subhash

WEB REFERENCES

1. Head First Java: A Brain-Friendly Guide 2nd Edition,Kindle Edition by Kathy Sierra.
2. Effective Java: A Programming Language Guide (Java Series) 2nd Edition, Kindle Edition by Joshua Bloch.
3. AI Algorithms, Data Structures, and Idioms in Prolog, Lisp, and JavaPaperback – Import, 25 Aug 2008 by George F. Luger (Author), William A Stubblefield (Author).

E -TEXT BOOKS

1. Introduction to Java Programming and Data Structures, Comprehensive Version (11th Edition) 11th Edition by Y. Daniel Liang.
2. Java How to Program, Early Objects (11th Edition) (Deitel: How to Program) 11th Edition by Paul J. Deitel (Author), Harvey Deitel (Author).

MOOCS COURSES

1. https://www.mooc-list.com › tags › java-programming
2. https://www.mooc-list.com › tags › java
3. https://www.edx.org › learn › java
4. https://www.quora.com › What-are-the-best-MOOCs-for-learning-Java

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

GENDER SENSITIZATION LAB

II B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
GS409MC	B. Tech	0	0	2	-	100	-	100

COURSE OBJECTIVES

To learn

1. To develop students' sensibility with regard to issues of gender in contemporary India.
2. To provide a critical perspective on the socialization of men and women.
3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work.
5. To help students reflect critically on gender violence.
6. To expose students to more egalitarian interactions between men and women.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Students will have developed a better understanding of important issues related to gender in contemporary India.
2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
3. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
4. Students will acquire insight into the gendered division of labour and its relation to politics and economics.
5. Men and women students and professionals will be better equipped to work and live together as equals.
6. Students will develop a sense of appreciation of women in all walks of life.
7. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.

UNIT-I	UNDERSTANDING GENDER	Classes: 12

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT-II	GENDER ROLES AND RELATIONS	Classes: 12
GENDER ROLES AND RELATIONS: Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary		
UNIT-III	**GENDER AND LABOUR**	**Classes: 12**
GENDER AND LABOUR: Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."-Work: Its Politics and Economics - Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming		
UNIT-IV	**GENDER - BASED VIOLENCE**	**Classes: 12**
Gender - Based Violence: The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! - Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu". Domestic Violence: Speaking Out is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life."		
UNIT-V	**GENDER AND CULTURE**	**Classes: 12**
GENDER AND CULTURE: Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks The Brave Heart.		

TEXT BOOKS

1. Towards a World of Equals: A Bilingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu and published by Telugu Akademi, Hyderabad,Telangana State in the year 2015.

REFERENCE BOOKS

1. Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
2. Abdulali Sohaila. "I Fought For My Life…and Won."Available online at:
3. http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
4. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, 5th edition, Pearson Education.

WEB REFERENCES

1. Modified on 2015/05/14 10:40 by Sean Zheng — Categorized as: Chapter 2 – Education.
2. Hedman, Birgitta, Francesca Perucci and Pehr Sundström (1996). Engendering Statistic: A Tool for Change. Stockholm: Statistics Sweden.

3. Milek, Anne, Stork Christoph and Alison Gillwald (2011) Engendering communication: a perspective on ICT access and usage in Africa, Info, vol. 13 No. 3, pp.125-141. Bingley, United Kingdom: Emerald Group Publishing.
4. Hedman, Birgitta, Francesca Perucci and Pehr Sundström (1996). Engendering Statistic: A Tool for Change. Stockholm: Statistics Sweden.

E -TEXT BOOKS

1. Gender Sensitisation Hardcover – 2012 by Dr. Tanuja Trivedi (Author).

MOOCS COURSES

1. https://www.mooc-list.com › tags › gender-equality
2. https://www.udemy.com › course › gender-equality-and-sexual-diversity
3. https://www.edx.org › learn › gender-studies

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

FORMAL LANGUAGES & AUTOMATA THEORY

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS501PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To provide introduction to some of the central ideas of theoretical computer science from the perspective of formal languages.
2. To introduce the fundamental concepts of formal languages, grammars and automata theory.
3. Classify machines by their power to recognize languages.
4. Employ finite state machines to solve problems in computing
5. To understand deterministic and non-deterministic machines.
6. To understand the differences between decidability and undecidability.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Able to understand the concept of abstract machines and their power to recognize the languages.
2. Able to employ finite state machines for modelling and solving computing problems.
3. Able to design context free grammars for formal languages.
4. Able to distinguish between decidability and undecidability.
5. Able to gain proficiency with mathematical tools and formal methods.

UNIT-I	INTRODUCTION TO FINITE AUTOMATA	Classes: 12

Introduction to Finite Automata: Structural Representations, Automata and Complexity, the Central Concepts of Automata Theory – Alphabets, Strings, Languages, Problems.
Nondeterministic Finite Automata: Formal Definition, an application, Text Search, Finite Automata with Epsilon-Transitions.

Deterministic Finite Automata: Definition of DFA, How A DFA Process Strings, The language of DFA, Conversion of NFA with €-transitions to NFA without €-transitions. Conversion of NFA to DFA, Moore and Melay machines

UNIT-II	REGULAR EXPRESSIONS	Classes: 12

Regular Expressions: Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Conversion of Finite Automata to Regular Expressions.

Pumping Lemma for Regular Languages: Statement of the pumping lemma, Applications of the Pumping Lemma.

Closure Properties of Regular Languages: Closure properties of Regular languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

UNIT-III	CONTEXT-FREE GRAMMARS	Classes: 14

Context-Free Grammars: Definition of Context-Free Grammars, Derivations Using a Grammar, Leftmost and Rightmost Derivations, the Language of a Grammar, Sentential Forms Parse Tress, minimization of context free grammars, Applications of Context-Free Grammars Ambiguity in Grammars and Languages.

Normal Forms for Context- Free Grammars: Chomsky Normal form Griebech Normal form, Pumping Lemma for Context Free Languages.

UNIT-IV	PUSH DOWN AUTOMATA	Classes: 15

Push Down Automata: Definition of the Pushdown Automaton, the Languages of a PDA, Equivalence of PDA's and CFG's, Acceptance by final state, Acceptance by empty stack, Deterministic Pushdown Automata. From CFG to PDA, From PDA to CFG.

Closure Properties of Context-Free Languages: Closure properties of CFL's, Decision Properties of CFL's.

Turing Machines: Introduction to Turing Machine, Formal Description, Instantaneous description, The language of a Turing machine, Computable functions, Church's hypothesis.

UNIT-V	TYPES OF TURING MACHINE	Classes: 12

Types of Turing machine: Turing machines and halting

Undecidability: Undecidability, A Language that is Not Recursively Enumerable, Recursively enumerable languages, An Undecidable Problem That is RE, Undecidable Problems about Turing Machines, Recursive languages, Properties of recursive languages, Post's Correspondence Problem, Modified Post Correspondence problem, Other Undecidable Problems, Counter machine, linear bounded automata and context sensitive language, Chomsky hierarchy of languages.

TEXT BOOKS

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition,John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education.
2. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.

REFERENCE BOOKS

1. Introduction to Languages and The Theory of Computation, John C Martin, TMH.
2. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
3. A Text book on Automata Theory, P. K. Srimani, Nasir S. F. B, Cambridge University Press.

4. Introduction to the Theory of Computation, Michael Sipser, 3rd edition, Cengage Learning. 5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan,Rama R, Pearson.
WEB REFERENCES
1. https://en.wikipedia.org/wiki/Software project management
E -TEXT BOOKS
1.https://www.edutechlearners.com/download/Software%20Project%20Management.pdf
MOOC COURSES
1. https://swayam.gov.in/nd1_noc19_cs70/preview 2. https://www.udemy.com/software-architecture-for-the-enterprise-architecture

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SOFTWARE ENGINEERING

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS502PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. Student will be able to learn fundamental aspects of Software Engineering and analyze various process models.
2. To identify various types of requirements and the process for Requirements Engineering.
3. To make use of various System Models to conceptualize and construct a system.
4. To demonstrate different testing tactics and define metrics for software measurement.
5. To classify and mitigate the Software Risks and learn to achieve quality standards.

COURSE OUTCOMES

1. To understand software process models such as waterfall and evolutionary models.
2. To understand software requirements and SRS document.
3. Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD).
4. To understand software testing approaches such as unit testing and integration testing.
5. To understand quality control and how to ensure good quality software through quality assurance.

UNIT-I	INTRODUCTION TO SOFTWARE ENGINEERING	Classes: 12

Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process: Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI).

Process models: The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

UNIT-II	SOFTWARE REQUIREMENTS	Classes: 12

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, requirements elicitation and analysis,requirements validation, requirements management.

System models: Context models, behavioral models

UNIT-III	DESIGN ENGINEERING	Classes: 12

Design Engineering: Design process and design quality, design concepts, the design model. **Creating an architectural design:** software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modelling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT-IV	TESTING STRATEGIES	Classes: 14

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, Unit Testing, Integration Testing, validation testing,system testing, the art of debugging.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

Metrics for Process and Products: Software measurement, metrics for software quality

UNIT-V	RISK MANAGEMENT	Classes: 10

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXT BOOKS

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India,2010.
2. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill,2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI,2005

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Software_engineering

E -TEXT BOOKS

1. https://books.google.co.in/books?id=bL7QZHtWvaUC&printsec=frontcover&dq=software+engineering+by+roger+pressman+vth+edition+free+download&hl=en&sa=X&ved=0ahUKEwiLkOz-pL_TAhWIuI8KHZSxD2cQ6AEIMDAC#v=onepage&q&f=false

MOOC COURSES

1. https://www.coursera.org/specializations/software-development-lifecycle
2. https://www.mooc-list.com/tags/software-engineering

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

COMPUTER NETWORKS

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS503PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

The objective of the course is to equip the students with a general overview of the concepts and fundamentals of computer networks.

1. Familiarize the students with the standard models for the layered approach to communication between machines in a network and the protocols of the various layers.

COURSE OUTCOMES

1. Gain the knowledge of the basic computer network technology.
2. Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
3. Obtain the skills of subnetting and routing mechanisms.
4. Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.

UNIT-I	INTRODUCTION OF COMPUTER NETWORKS	Classes: 12

Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet. Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fibre optics, Wireless transmission. Wireless Networks – Packet Radio Network, Wireless LAN: IEEE 802.11b, Wireless Application Protocols (WAP) & WML and Virtual Private Network VPN Technology.

UNIT-II	DATA LINK LAYER	Classes: 12

Data link layer: Design issues, framing, Error detection and correction. Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error free channel, A simplex stop and wait protocol for noisy channel. Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols. Medium Access sub layer: The channel allocation problem, Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

UNIT-III	NETWORK LAYER	Classes: 10
Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet, Transmission form IPV4 to IPV6.		
UNIT-IV	**TRANSPORT LAYER**	**Classes: 12**
Transport Layer: Transport Services, Elements of Transport protocols, Connection management, TCP and UDP protocols.		
UNIT-V	**APPLICATION LAYER**	**Classes: 12**
Application Layer –Domain name system, SNMP, Protocols - TELNET & SSH, Electronic Mail; the World WEB, HTTP, Streaming audio and video.		

TEXT BOOKS

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI
2. Advanced Computer Network-B.M Harwani DT Editorial Service.

REFERENCE BOOKS

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education.

WEB REFERENCES

1. https://www.geeksforgeeks.org/what-is-Computer-Networks/
2. https://searchsecurity.techtarget.com/definition/Computer-Networksinfosec
3. https://www.cisco.com › Products & Services › Networks

E -TEXT BOOKS

1. http://study-ccna.com/

MOOCS COURSES

1. https://nptel.ac.in/courses/106105081/
2. https://www.geeksforgeeks.org/computer- network-routing-protocols-set-1-distance-vector-routing/
3. https://www.tutorialspoint.com/errorcontrol-in-data-link-layer

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEMS

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS504PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques.

UNIT-I	DATABASE SYSTEM APPLICATIONS	Classes: 12

Database System Applications: A Historical Perspective, File Systems versus a DBMS, view of data, data abstraction instances and schema, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model, Database languages-DDL,DML,DCL,TCL

UNIT-II	INTRODUCTION TO THE RELATIONAL MODEL	Classes: 12

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity Constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra-selection and projection set operations renaming joins-divisions, Relational calculus, Tuple relational Calculus, Domain relational calculus.

UNIT-III	SQL: QUERIES, CONSTRAINTS, TRIGGERS	Classes: 10

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases. Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT-IV	**TRANSACTION CONCEPT**	**Classes: 12**

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions

UNIT-V	**DATA ON EXTERNAL STORAGE**	**Classes: 12**

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS

1. Fundamentals of Data Base Management Systems by Dr. P. Santosh Kumar Patra, Sri Krishna Publishing Company Pvt. Ltd.
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, Vedition.

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, the X Team, S.Shah and V. Shah,SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

WEB REFERENCES

1. http://www.freebookcentre.net/Database/Free-Database-Systems-Books-Download.html
2. https://www.gatevidyalay.com/transaction-states-in-dbms/

E -TEXT BOOKS

1. http://www.ebooks-for-all.com/bookmarks/detail/Database-Management-Systems/onecat/0.html.
2. http://freecomputerbooks.com/dbSystemsBooks.html

MOOCS COURSES
1. https://swayam.gov.in/nd2_cec19_cs05/preview 2. https://swayam.gov.in/nd2_nou19_lb03/preview

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SOFTWARE ENGINEERING LAB

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS505PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to translate end-user requirements into system and software requirements
2. Ability to generate a high-level design of the system from the software requirements
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

LIST OF EXPERIMENTS

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects:

1) Development of problem statement.
2) Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents.
3) Preparation of Software Configuration Management and Risk Management related documents.
4) Study and usage of any Design phase CASE tool
5) Performing the Design by using any Design phase CASE tools.
6) Develop test cases for unit testing and integration testing
7) Develop test cases for various white box and black box testing techniques.

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration

4. Online course reservation system
5. E-ticketing
6. Software Personnel Management System
7. E-book management System.
8. Recruitment system

TEXT BOOKS

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCE BOOKS

1. https://www.technicalsymposium.com/Lecturenotes_CS6403_Unit2.htmlhttp://web.math.ku.dk/~helle/R-intro/exercises.pdf

WEB REFERENCES

1. https://en.wikibooks.org/wiki/Introduction_to_Software_Engineering

E -TEXT BOOKS

1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-170-laboratory-in-software-engineering-fall-2005/

MOOCS COURSES

1. https://www.mooc-list.com/tags/software-engineering
2. https://www.coursera.org/courses?query=software%20engineering

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

COMPUTER NETWORKS LAB

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS506PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To understand the working principle of various communication protocols.
2. To understand the network simulator environment and visualize a network topology and observe its performance
3. To analyse the traffic flow and the contents of protocol frames

COURSE OUTCOMES

1. Implement data link layer farming methods
2. Analyze error detection and error correction codes.
3. Implement and analyze routing and congestion issues in network design.
4. Implement Encoding and Decoding techniques used in presentation layer
5. To be able to work with different network tools

LIST OF EXPERIMENTS

1. Implement the data link layer framing methods such as character, character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting technique used in buffers.
10. Wireshark
    i. Packet Capture Using Wire shark

ii. Starting Wire shark

iii. Viewing Captured Traffic

iv. Analysis and Statistics & Filters.

11. How to run Nmap scan

12. Operating System Detection using Nmap

13. Do the following using NS2 Simulator

i. NS2 Simulator-Introduction

ii. Simulate to Find the Number of Packets Dropped

iii. Simulate to Find the Number of Packets Dropped by TCP/UDP

iv. Simulate to Find the Number of Packets Dropped due to Congestion

v. Simulate to Compare Data Rate& Throughput.

vi. Simulate to Plot Congestion for Different Source/Destination

vii. Simulate to Determine the Performance with respect to Transmission of Packets

TEXT BOOKS

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

REFERENCE BOOKS

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

WEB REFERENCES

1. https://www.geeksforgeeks.org/what-is-Computer-Networks/
2. https://searchsecurity.techtarget.com/definition/Computer-Networksinfosec
3. https://www.cisco.com › Products & Services › Networks

E -TEXT BOOKS

1. http://study-ccna.com/

MOOCS COURSES

1. https://nptel.ac.in/courses/106105081/
2. https://www.geeksforgeeks.org/computer- network-routing-protocols-set-1-distance-vector-routing/
3. https://www.tutorialspoint.com/errorcontrol-in-data-link-layer

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEMS LAB

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS507PC	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

To learn

1. Introduce ER data model, database design and normalization
2. Learn SQL basics for data definition and data manipulation

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Design database schema for a given application and apply normalization
2. Acquire skills in using SQL commands for data definition and data manipulation.
3. Develop solutions for database applications using procedures, cursors and triggers.

LIST OF EXPERIMENTS

1. Concept design with E-R Model
2. Relational Model
3. Normalization
4. Practicing DDL commands
5. Practicing DML commands
6. Querying (using ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.)
7. Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.
8. Triggers (Creation of insert trigger, delete trigger, update trigger)
9. Develop a program using BEFORE and AFTER triggers, row and statement triggers and instead of triggers.
10. Develop a program using creation of procedures, passing parameters IN and OUT of Procedure.
11. Develop a program using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and cursor VARIABLES.

TEXT BOOKS

1. Fundamentals of Database Management Systems by Dr. P.Santosh Kumar Patra, Sri

Krishna Publishing Company Pvt. Ltd.
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill, 3rd Edition.
3. Database System Concepts, Silberschatz, Korth, McGraw Hill, Vedition.

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, ElmasriNavrate, Pearson Education
3. Introduction to Database Systems, C.J. Date, Pearson Education
4. Oracle for Professionals, the X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

WEB REFERENCES

1. http://www.freebookcentre.net/Database/Free-Database-Systems-Books-Download.html
2. https://www.gatevidyalay.com/transaction-states-in-dbms/

E -TEXT BOOKS

1. http://www.ebooks-for-all.com/bookmarks/detail/Database-Management-Systems/onecat/0.html
2. http://freecomputerbooks.com/dbSystemsBooks.html

MOOCS COURSES

1. https://swayam.gov.in/nd2_cec19_cs05/preview
2. https://swayam.gov.in/nd2_nou19_lb03/preview

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

INTELLECTUAL PROPERTY RIGHTS

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
IP508MC	B. Tech	3	0	0	0	100	---	100

COURSEOBJECTIVES:

1. To acquaint the learners with the basic concepts of Intellectual Property Rights.
2. To develop expertise in the learners in IPR related issues and sensitize the learners with the emerging issues in IPR and the rationale for the protection of IPR.

COURSEOUTCOMES:

Upon successful completion of the course

1. Gain knowledge on Intellectual Property assets and generate economic wealth.
2. Assist individuals and organizations in capacity building and work as a platform for development, promotion, protection, compliance, and enforcement of Intellectual Property & knowledge.
3. Gather knowledge about Intellectual Property Rights which is important for students of engineering in particular as they are tomorrow's technocrats and creator of new technology.
4. Discover how IPR are regarded as a source of national wealth and mark of an economic leadership in context of global market scenario.
5. Study the national & International IP system.

Summarize that it is an incentive for further research work and investment in R & D, leading to creation of new and better products and generation of economic and social.

UNIT-I	INTELLECTUAL PROPERTY ACT AND LAW	Classes:7

Introduction to intellectual property Act and Law-the evolutionary past the IPR tool kit- legal tasks in intellectual property law-ethical obligations in Para legal tasks in intellectual property law

UNIT-II	INTRODUCTION TO TRADE MARK	Classes:8

Introduction to trade mark – Trade mark registration process-Post registration procedures-Trade mark maintenance – transfer of rights- inter party's proceeding – Infringement-Dilution ownership of trade mark likelihood of confusion – trademark claims- trademark litigations

UNIT-III	INTRODUCTION TO COPY RIGHTS	Classes:6
Introduction to copy rights- principles of copyright – subjects matter of copy right- rights afforded by copyright law- copyright ownership- transfer and duration – right to prepare derivative works- right of distribution right to perform the work publicity- copyright formalities and registrations		
UNIT-IV	**TRANSACTION CONCEPT**	**Classes: 12**
Introduction to patent law- Rights and limitations- Rights under patent law- patent requirements- ownership – transfer- patent application process patent infringement- patent litigation, Patent information and database, Licensing and transfer of technology		
UNIT-V	**DATA ON EXTERNAL STORAGE**	**Classes: 12**
Introduction to transactional law- creating wealth and managing risk – employment relationship in the Internet and technological sector- contact for internet and technological sector		

TEXT BOOKS

1. Kompal Bansal and Praishit Bansal, "Fundamentals of IPR for Engineers", 1st Edition, BS Publications, 2012.
2. Prabhuddha Ganguli, "Intellectual Property Rights",1st Edition, TMH, 2012.

REFERENCE BOOKS:

1. R Radha Krishnan & S Balasubramanian, "Intellectual Property Rights", 1st Edition, Excel Books, 2012.
2. M Ashok Kumar & mohd Iqbal Ali, "Intellectual Property Rights", 2nd Edition, Serialpublications, 2011.

WEB REFERENCES:

1. http://libgen.rs/book/index.php?md5=C4A6559ECCAEFC767CE71BD91A1BAD41
2. http://libgen.rs/book/index.php?md5=6463CAD16544B347B19335FB19D6917C

E –TEXT BOOKS:

1. http://libgen.rs/book/index.php?md5=13C4B3A45B1C95B4A388F94729CCCFBC
2. https://maklaw.in/intellectualpropertyrights/?gclid=EAIaIQobChMIsprsv_WI7QIVilVgCh29HwPzEAAYASAAEgK5YvD_BwE

MOOCS COURSES:

1. https://nptel.ac.in/courses/110/105/110105139/
2. https://nptel.ac.in/courses/109/106/109106137/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

MACHINE LEARNING

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS601PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
3. Understand the Neural Networks and its usage in machine learning application.

UNIT-I	INTRODUCTION TO MACHINE LEARNING	Classes: 12

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias. Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT-II	ARTIFICIAL NEURAL NETWORKS	Classes: 12

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm. Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks. Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms

UNIT-III	BAYESIAN LEARNING	Classes: 10
Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm. Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning. Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.		
UNIT-IV	**GENETIC ALGORITHMS**	**Classes: 12**
Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms. Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution. Reinforcement Learning – Introduction, the learning task, Q–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.		
UNIT-V	**ANALYTICAL LEARNING AND COMBINING INDUCTIVE**	**Classes: 12**
Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge. Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators. Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.		

TEXT BOOKS

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

WEB REFERENCES

1. https://www.coursera.org/learn/machine-learning
2. https://www.ibm.com/in-en/cloud/learn/machine-learning
3. https://www.geeksforgeeks.org/machine-learning/
4. https://www.expert.ai/blog/machine-learning-definition/

E -TEXT BOOKS

1. https://machinelearningmastery.com/products/

2. https://www.kdnuggets.com/2020/03/24-best-free-books-understand-machine-learning.html
3. https://www.analyticsinsight.net/10-popular-must-read-free-ebooks-on-machine-learning/
4. https://alex.smola.org/drafts/thebook.pdf

MOOCS COURSES

1. https://www.geeksforgeeks.org/Machine Learning
2. https://nptel.ac.in/courses/106105087/pdf/m01L01.pdf
3. https://onlinecourses.nptel.ac.in/noc21_cs13/preview.
4. https://www.tutorialspoint.com/machine_engineering/index.htm

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

COMPILER DESIGN

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS602PC	B. Tech	3	1	0	4	30	70	100

COURSE OBJECTIVES

To learn

1. Introduce the major concepts of language translation and compiler design and impart the knowledge of practical skills necessary for constructing a compiler.
2. Topics include phases of a compiler, parsing, syntax-directed translation, type checking use of symbol tables, code optimization techniques, intermediate code generation, code generation, and data flow analysis.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Demonstrate the ability to design a compiler given a set of language features.
2. Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.
3. Acquire skills in using lex tool & yacc tool for developing a scanner and parser.
4. Design and implement LL and LR parsers
5. Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.
6. Design algorithms to generate machine code.

UNIT-I	INTRODUCTION	Classes: 12

Introduction: The structure of a compiler, the science of building a compiler, programming language basics.
Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Pass and Phases of Translation, Interpretation, Bootstrapping, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

UNIT-II	PARSING TECHNIQUES	Classes: 16

Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, YACC- Automatic Parser.

UNIT-III	SEMANTIC ANALYSIS	Classes: 13

Syntax-Directed Definitions, Evaluation Orders for SDD's, Applicationsof Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-AttributedSDD's.
Intermediate-Code Generation: Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

UNIT-IV	RUN TIME MEMORY MANAGEMENT	Classes: 11

Data structure for symbol tables, representing scope information, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, DAG Representation- Basic Blocks and Flow Graphs.

UNIT-V	CODE GENERATION	Classes: 11

Code Optimization: Optimization of Basic Blocks, A Simple Code Generator Register Allocation and Assignment, Dynamic Programming Code-Generation, Consideration for Optimization, Scope of Optimization, Local Optimization, Loop Optimization, Peephole Optimization, Frequency Reduction, Folding.

Machine-Independent Optimization: The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs.

TEXT BOOKS

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffry D. Ullman.
2. Modern Compiler Implementation in C, Andrew N. Appel, Cambridge University Press.
3. Principles of Compiler Design, V Raghavan, Tata McGraw Hill

REFERENCE BOOKS

1. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly
2. Compiler Construction, Louden, Thomson.
3. Modern Compiler Design- Dick Grune, Henry E. Bal, Cariel T. H. Jacobs, Wiley dreamtech.
4. Engineering a Compiler-Cooper & Linda, Elsevier.

WEB REFERENCES

1. https://www.cse.iitd.ac.in/~sbansal/col728/references.html
2. https://www.tutorialspoint.com/compiler_design/compiler_design_useful_resources.htm
3. https://onlinecourses.nptel.ac.in/noc21_cs07/preview
4. https://www.tutorialspoint.com/compiler_design/index.htm

E -TEXT BOOKS
1. https://www3.nd.edu/~dthain/compilerbook/
MOOCS COURSES
1. https://onlinecourses.nptel.ac.in/noc21_cs07/preview 2. https://nptel.ac.in/courses/106/104/106104123/ 3. https://nptel.ac.in/courses/106/105/106105190/ 4. https://nptel.ac.in/courses/106/104/106104072/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DESIGN AND ANALYSIS OF ALGORITHMS

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS603PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to analyze the performance of algorithms
2. Ability to choose appropriate data structures and algorithm design methods for a specified application
3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs

UNIT-I	INTRODUCTION ALGORITHM NOTATIONS AND DIVIDE AND CONQUER	Classes: 12

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation. Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT-II	DISJOINT SETS AND BACKTRACKING	Classes: 12

Disjoint Sets: Disjoint set operations, union and find algorithms Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT-III	DYNAMIC PROGRAMMING	Classes: 10
Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.		
UNIT-IV	**GREEDY METHOD**	**Classes: 12**
Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem		
UNIT-V	**BRANCH AND BOUND, NP-HARD AND NP-COMPLETE PROBLEMS**	**Classes: 12**
Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution. NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem		

TEXT BOOKS

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons.

WEB REFERENCES

1. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
2. https://www.javatpoint.com/daa-tutorial
3. https://www.guru99.com/design-analysis-algorithms-tutorial.html
4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015

E -TEXT BOOKS

1. https://www.kopykitab.com/Design-and-Analysis-of-Algorithms-eBook-By-V-K-Pallaw-isbn-9788184121681
2. https://freecomputerbooks.com/Introduction-to-Design-Analysis-of-Algorithms.html
3. https://www.ebooknetworking.net/ebooks/design-analysis-of-algorithm-book.html

MOOCS COURSES
1. https://onlinecourses.nptel.ac.in/noc21_cs07/preview 2. https://nptel.ac.in/courses/106/104/106104123/ 3. https://nptel.ac.in/courses/106/105/106105190/ 4. https://nptel.ac.in/courses/106/104/106104072/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

MACHINE LEARNING LAB

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS605PC	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. understand complexity of Machine Learning algorithms and their limitations;
2. understand modern notions in data analysis-oriented computing;
3. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

LIST OF EXPERIMENTS

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 schooldays in a week, the probability that it is Friday is 20 %. What is theprobability that a student is absent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)
2. Extract the data from database using python
3. Implement k-nearest neighbours classification using python
4. Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of kmeans clustering with 3 means (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1

0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

medium skiing design single twenties no -> highRisk
high golf trading married forties yes -> lowRisk
low speedway transport married thirties yes -> medRisk
medium football banking single thirties yes -> lowRisk
high flying media married fifties yes -> highRisk
low football security single twenties no -> medRisk
medium golf media single thirties yes -> medRisk
medium golf transport married forties yes -> lowRisk
high skiing banking single thirties yes -> highRisk
low golf unemployed married forties yes -> highRisk Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `medRisk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

TEXT BOOKS

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

WEB REFERENCES

1. https://www.coursera.org/learn/machine-learning
2. https://www.ibm.com/in-en/cloud/learn/machine-learning
3. https://www.geeksforgeeks.org/machine-learning/
4. https://www.expert.ai/blog/machine-learning-definition/

E -TEXT BOOKS

1. https://machinelearningmastery.com/products/
2. https://www.kdnuggets.com/2020/03/24-best-free-books-understand-machine-learning.html
3. https://www.analyticsinsight.net/10-popular-must-read-free-ebooks-on-machine-

learning/ 4. https://alex.smola.org/drafts/thebook.pdf
MOOCS COURSES
1. https://onlinecourses-archive.nptel.ac.in 2. https://swayam.gov.in/ 3. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ADVANCED COMMUNICATION SKILLS LAB

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
EN606HS	B. Tech	0	0	2	1	30	70	100

INTRODUCTION

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalized context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

OBJECTIVES

This Lab focuses on using multi-media instruction for language development to meet the following targets:

1. To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
2. Further, they would be required to communicate their ideas relevantly and coherently in writing.
3. To prepare all the students for their placements.

SYLLABUS

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. Activities on Reading Comprehension –General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.

3. Activities on Writing Skills – Structure and presentation of different types of writing – letter writing/Resume writing/ e-correspondence/Technical report writing/ – planning for writing – improving one's writing.

4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM Sessions / seminars / PPTs and written presentations through posters/projects/reports/ emails / assignments etc.

5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, Intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and MockInterviews.

MINIMUM REQUIREMENT:

The Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dream tech
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS

1. Effective Technical Communication by M Asharaf Rizvi. McGraw Hill Education (India) Pvt. Ltd.2nd Edition.
2. Academic Writing: A Handbook for International Students by Stephen Bailey, Routledge, 5th Edition.

REFERENCE BOOKS

1. Learn Correct English – A Book of Grammar, Usage and Composition by Shiv K. Kumar and Hemalatha Nagarajan. Pearson 2007
2. Professional Communication by Aruna Koneru, McGraw Hill Education (India) Pvt. Ltd, 2016.
3. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University Press 2009.
4. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi
5. English Vocabulary in Use series, Cambridge University Press 2008
6. Handbook for Technical Communication by David A. McMurrey & Joanne Buckley. 2012. Cengage Learning.
7. Communication Skills by Leena Sen, PHI Learning Pvt Ltd., New Delhi, 2009.
8. Job Hunting by Colm Downes, Cambridge University Press 2008.
9. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.

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1. https://www.asha.org/PRPSpecificTopic.aspx?folderid=8589935321&section=Refere nces
2. Argyle, Michael F., Alkema, Florisse, & Gilmour, Robin. "The communication of friendly and hostile attitudes: Verbal and nonverbal signals." European Journal of Social Psychology, 1, 385- 402:1971
3. Blumer, Herbert. Symbolic interaction: Perspective and method. Engle wood Cliffs; NJ: Prentice Hall.1969

E –TEXTBOOKS:

1. Mc corry Laurie Kelly Mc Corry Jeff Mason, Communication Skills for the Healthcare Professional, 1st edition,ISBN:1582558140, ISBN-13:9781582558141
2. Robert E Owens, Jr, Language Development, 9th edition, ISBN:0133810364, 9780133810363

MOOCS Course:

1. https://www.coursera.org/specializations/improve-english
2. https://www.edx.org/professional-certificate/upvalenciax-upper-intermediate-english

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ENVIRONMENTAL SCIENCE

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
ES604BS	B. Tech	3	0	0	0	100	---	100

COURSE OBJECTIVES

To learn

1. Analyze the inter relationship between living organism and environment
2. Describe various types of natural resources available on the earth surface
3. Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity
4. Explain the causes, effects and control measures of various types of environmental pollutions
5. Understand the importance of environment by assessing its impact on the human world

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Differentiate between various biotic and abiotic components of ecosystem
2. Describe the various types of natural resources
3. Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India
4. Illustrate causes, effects, and control measures of various types of environmental pollutions
5. Understand technologies on the basis of ecological principles environmental regulations which in turn helps in sustainable development

UNIT-I	ECOSYSTEMS	Classes: 8

Definition, Scope, and Importance of ecosystem. Classification, structure and function of an ecosystem, food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification.

UNIT-II	NATURAL RESOURCES	Classes: 8

Classification of Resources: Living and Non-Living resources.
Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems.
Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources
Land resources: Forest resources.
Energy resources: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III	BIODIVERSITY AND BIOTIC RESOURCES	Classes: 7

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic, optional values and hotspots of biodiversity. Endangered and endemic species of India, Threats to biodiversity; habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT-IV	ENVIRONMENTAL POLLUTION	Classes: 9

Types of pollution, Causes, effects and prevention and control measures of air, water, soil, noise and thermal pollution. Solid waste and e-waste management.

UNIT-V	ENVIRONMENTAL POLICY AND SUSTAINABLE DEVELOPEMENT	Classes: 10

Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion- crazy consumerism. Green building concept. Water conservation, Rainwater harvesting, watershed management. Environmental Policies and Legislations: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Forest (conservation) Act, 1980. Wildlife Protection Act.

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12 Edition, 2015

REFERENCE BOOKS

1. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

WEB REFERENCES

1. https://www.britannica.com/science/ecosystem
2. https://ocw.mit.edu/resources/#EnvironmentandSustainability

E -TEXT BOOKS

1. P N Palanisamy Environmental Science ISBN:9788131773253, eISBN:97899332509771 Edition: Second edition 2. Environmental Studies. Author, Dr. J. P. Sharma. Publisher, Laxmi Publications, 2009 ISBN, 8131806413, 9788131806418.
MOOCS COURSE
1. https://nptel.ac.in/courses/122103039/38 2. https://nptel.ac.in/courses/106105151/12

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

CRYPTOGRAPHY & NETWORK SECURITY

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS701PC	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Explain the objectives of information security.
2. Understand various cryptographic algorithms.
3. Understand the basic categories of threats to computers and networks.
4. Describe public-key cryptosystem.
5. Discuss the fundamental ideas of public-key cryptography.
6. Discuss Web security and Firewalls.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Studentwillbeabletounderstandbasiccryptographicalgorithms,message and Web Authentication and security issues.
2. Abilitytoidentifyinformationsystemrequirementsforbothofthemsuchasclientand Server.
3. Abilitytounderstandthecurrentlegalissuestowardsinformationsecurity.
4. Ability to understand the various types of security attacks.
5. Ability to understand about various encryption techniques.
6. Ability to understand message authentication and hash functions.

UNIT-I	INTRODUCTION	Classes: 12

SecurityConcepts**:**Introduction,Theneedforsecurity,Securityapproaches,Principlesofsecurity,Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography Concepts and Techniques: Introduction, plaintext and ciphertext, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT-II	SYMMETRIC KEY CIPHERS, ASYMMETRIC KEY CIPHERS	Classes: 14

Symmetrickey Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Blockcipher operation, Streamciphers, RC4. Asymmetrickey Ciphers: Principles of publickey cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Elliptic Curve Cryptography, Knapsack Algorithm.		
UNIT-III	**CRYPTOGRAPHIC HASH FUNCTIONS,MESSAGE AUTHENTICATION CODES**	**Classes: 13**
Cryptographic Hash Functions: Message Authentication, Applications of cryptographic Hash functions, Secure Hash Algorithm (SHA-512), Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme. Key Management and Distribution: Symmetric Key Distribution Using Symmetric & AsymmetricEncryption,DistributionofPublicKeys,Kerberos,X.509AuthenticationService,Public –Key Infrastructure		
UNIT-IV	**TRANSPORT LEVEL SECURITY,WIRELESS NETWORK SECURITY**	**Classes: 11**
Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH), Wireless Security, Mobile Device Security, IEEE802.11 Wireless LAN, IEEE802.11i Wireless LAN Security		
UNIT-V	**E-MAIL SECURITY**	**Classes: 12**
Pretty Good Privacy, S/MIMEIP Security**:** IP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, Internet Key Exchange, Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter branch Payment Transactions, Cross site Scripting Vulnerability.		

TEXT BOOKS

1. Cryptography and Network Security-Principles and practices: Willings Stallings Pearson education, 6th Edition.
2. Cryptography and Network Security: Atulkahate, Mc Graw Hill 3rd Edition.

REFERENCE BOOKS

1. Cryptography and Network Security: CKShyamala, NHarini, Dr T R Padmanabhan, Wiley India, 1st edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, McGrawHill, 3rd Edition.
3. Information Security, Principles, and Practice: MarkStamp, WileyIndia.

WEB REFERENCES

1. https://www.williamstallings.com/crypto/Crypto4e.html
2. https://nptel.ac.in/courses/106/105/106105162/

3. https://nptel.ac.in/courses/106/106/106106221/
4. https://www.edx.org/learn/cryptography

E -TEXT BOOKS

1. http://williamstallings.com/Cryptography/

MOOCS COURSES

1. https://www.coursera.org/courses?query=cryptography
2. https://nptel.ac.in/courses/106/105/106105031/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATA MINING

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS702PC	B. Tech	2	0	0	2	30	70	100

COURSE OBJECTIVES

1. It Presents methods for mining frequent patterns, associations, and correlations.
2. It then describes methods for data classification and prediction, and data-clustering approaches.
3. It covers mining various types of data stores such as spatial, textual, multimedia, streams.

COURSE OUTCOMES

1. Ability to understand the types of the data to and present a general classification of tasks and primitives to integrate a data mining system.
2. Apply pre-processing methods for any given raw data.
3. Extract interesting patterns from large amounts of data.
4. Discover the role played by datamining in various fields.
5. Choose and employ suitable datamining algorithms to build analytical applications
6. Evaluatetheaccuracyofsupervisedandunsupervisedmodelsandalgorithms

UNIT-I	DATA MINING and DATA WAREHOUSE	Classes: 14

Data–Types of Data–,Data Mining Functionalities–Interestingness Patterns–Classification of Data Mining systems–Data mining Task primitives–Integration of Data mining system with a Data ware house–Major issues in Data Mining–Data Pre-processing. Introduction to Data warehousing, Difference between operational Database Systems and Data Warehouses, A Multidimensional Data Model, Data warehouse Architecture.

UNIT-II	ASSOCIATION RULE MINING	Classes: 12

Mining Frequent Patterns–Associations and correlations–Mining Methods– Mining Various kinds of Association Rules – Correlation Analysis–Constraint based Association mining. Graph Pattern Mining, SPM.

UNIT-III	CLASSIFICATION	Classes: 10
Classification and Prediction– Basic concepts–Decision tree induction–Bayesian classification, Rule–based classification, Lazylearner.		
UNIT-IV	**CLUSTERING AND APPLICATIONS**	**Classes: 12**
Cluster analysis–Types of Data in Cluster Analysis–Categorization of Major Clustering Methods– Partitioning Methods, Hierarchical Methods– Density–Based Methods, Outlier Analysis.		
UNIT-V	**MINING COMPLEX TYPES OF DATA**	**Classes: 12**
Mining Time-Series and Sequence Data, Mining Spatial Datamining, Mining Multimedia, Mining Text Databases, Mining the world wide web, Data Mining Applications, Trends in Data Mining.		

TEXT BOOKS

1. Data Mining–Concepts and Techniques–Jiawei Han & Micheline Kamber, 3rd Edition Elsevier.
2. Data Mining Introductory and Advanced topics– Margaret HDunham, PEA.

REFERENCE BOOKS

1. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques (Second Edition), Morgan Kaufmann, 2005.

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Web_mining

E -TEXT BOOKS

1. http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf

MOOCS COURSES

1. https://www.coursera.org/specializations/data-mining
2. https://www.mooc-list.com/tags/data-mining

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

CRYPTOGRAPHY & NETWORK SECURITY LAB

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS703PC	B. Tech	0	0	2	1	30	70	100

COURSE OBJECTIVES

To learn

1. Explain the objectives of information security.
2. Understand various cryptographic algorithms.
3. Understand the basic categories of threats to computers and networks.
4. Describe public-key cryptosystem.
5. Discuss the fundamental ideas of public-key cryptography.
6. Discuss Web security and Firewalls.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Student will be able to understand basic cryptographic algorithms, message and Web Authentication and security issues.
2. Ability to identify information system requirements for both of them such as client and Server.
3. Ability to understand the current legal issues towards information security.
4. Ability to understand the various types of security attacks.
5. Ability to understand about various encryption techniques.
6. Ability to understand message authentication and hash functions.

LIST OF EXPERIMENTS

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and display the result.
2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.
3. Write a Java program to perform encryption and decryption using the following Algorithms: a. Ceaser cipher b. Substitution cipher c. Hill cipher
4. Write a Java program to perform encryption and decryption using the following transposition techniques: a. Rail fence Cipher b. Row transposion Cipher.

5. Write a C/JAVA program to implement the DES algorithm logic.
6. Write a C/JAVA program to implement the Blowfish algorithm logic.
7. Write a C/JAVA program to implement the Rijndael algorithm logic.
8. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own using Java key tool.
9. Write a Java program to implement RSA Algorithm.
10. Implement the Diffie-Hellman Key Exchange mechanism using HTML and java Script.
11. Calculate the message digest of a text using the SHA-1 Algorithm in Java.
12. Calculate the message digest of a text using the MD5 Algorithm in java.

TEXT BOOKS

1. Cryptography and Network Security-Principles and practices: Willings Stallings Pearson education, 6th Edition.
2. Cryptography and Network Security: Atul kahate, Mc Graw Hill 3rd Edition.

REFERENCE BOOKS

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan,Wiley India,1st edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill,3rd Edition.
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.

WEB REFERENCES

1. https://www.williamstallings.com/crypto/Crypto4e.html
2. https://nptel.ac.in/courses/106/105/106105162/
3. https://www.edx.org/learn/cryptography

E -TEXT BOOKS

1. http://williamstallings.com/Cryptography/

MOOCS COURSES

1. https://www.coursera.org/courses?query=cryptography
2. https://nptel.ac.in/courses/106/105/106105031/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

CONSTITUTION OF INDIA

IV B. TECH- I SEMESTER (R20)								
Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CI707MC	B. Tech	3	0	0	0	100	---	100

COURSE OBJECTIVES

To learn

Objective of the constitution of India is very well written in its preamble and that is to create a state which will be

This Course deals with Fundamentals and Structures of Indian Government; it is specifically designed to give a complete overview and in-depth knowledge regarding the concerns and challenges faced by the modern constitutional governments and elaborately discusses the structure, procedures, powers and duties of governmental institutions. The Course analyses in detail the basic functions of a written constitution. Also, the theories and concepts relating to constitutionalism, federalism, judicial review, constitutional interpretation, etc. are reviewed. All the discussions in the Course are updated according to the latest position and the modifications made by judicial intervention

1. Sovereign -independent to conduct internal as well as external affairs
2. Socialist - preventing concentration of wealth into few hands
3. Secular - respecting all religions equally
4. Democratic- government by the people, of the people, for the people
5. Republic - Head of the state will be elected not hereditary

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. To understand the basic concepts of democracy, republicanism, constitutionalism and to know about the constitutional theories, virtues and constitutional interpretation
2. To study and analyse the quasi-federal nature of Indian Constitution and the basic function of a written constitution regarding the allocation of State power, the functions, powers and limits of the organs of state
3. To analyse elaborately regarding the emergency and amendment procedures; the need for granting of special status or special provisions to some states
4. To know about Panchayats, Municipalities, Scheduled and Tribal areas5.To utilize Judiciary System of India

UNIT-I	INTERDUCTION TO INDIAN CONSTITUTION	Classes: 6

Meaning and importance of Constitution, Making of Indian Constitution, Salient features and the Preamble, Fundamental rights, Fundamental duties, Directive Principles.

UNIT-II	THE AMENDMENT OF THE CONSTITUTION	Classes: 6

Need for Amendment, Types of Amendment, Judicial Review of Constituent Power, Doctrine of Basic Structure, Major Amendments and their Constitutional Values.

UNIT-III	UNION & STATE EXECUTIVE AND LEGISLATURE	Classes:8
Lok Sabha & Rajya Sabha (Composition, Powers & Functions), President & Prime Minister (Powers, Functions, position), Supreme Court-Composition, Powers & Functions, The President: Powers, Functions and Procedure for Impeachment, Judicial Review of Presidents Actions, Governor: Powers, Functions ,Legislative Power of the Executive – Ordinance, Parliament and State Legislature ,Privileges of Legislature ,Council of Ministers - Prime Minister.		
UNIT-IV	**MAJOR FUNCTIONARIES & EMERGENCY POWERS**	**Classes: 6**
Union Public Service Commission , Election Commission, Planning Commission (NITI) , Significance of Emergency Powers, National Emergency – Grounds – Suspension of Fundamental Rights ,State Emergency – Grounds – Judicial Review , Financial Emergency.		
UNIT-V	**INDIAN JUDICIARY**	**Classes: 6**
Supreme Court of India – Appointment of Judges – Composition , Jurisdiction: Original, Appellate and Writ Jurisdiction , Prospective Overruling and Judge - Made Laws in India (Art. 141), Review of Supreme Court Decision , High Courts – Judges - Constitution , Jurisdiction: Original, Appellate, Writ Jurisdiction and Supervisory Jurisdiction		

TEXT BOOKS

1. H.M. Seervai: Constitutional Law of India
2. M.P. Jain: Indian Constitutional Law
3. Mahendra P. Singh: V. N. Shukla's Constitution of India
4. Granville Austin: The Indian Constitution: Cornerstone of a Nation

REFERENCE BOOKS

1. An Introduction to the Constitution of India by Dr.Durga Das Basu
2. An Introduction to the Constitution of India by M.V.Pylee
3. Indian Constitutional Law by M.P. Jain

WEB REFERENCES

1. https://www.wdl.org/en/item/2672/
2. https://nptel.ac.in/courses/109103135/24

E -TEXT BOOKS

1. https://iasexamportal.com/ebook/the-constitution-of-india
2. https://www.india.gov.in/my-government/documents/e-books

MOOCS COURSES

1. http://nludelhi.ac.in/images/moocs/moocs-courses.pdf
2. https://www.classcentral.com/tag/constitutional-law

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ORGANIZATIONAL BEHAVIOUR

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
OB801MS	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To provide the students with the conceptual framework and the theories underlying Organizational Behavior.

1. Understand the environmental and organizational context.
2. Knowledge on cognitive process
3. Understand dynamics and communications in organizational behaviour.
4. Gain knowledge in power and politics.
5. Job design and Goal setting for High performance

COURSE OUTCOMES

Upon the completion of the subject, the student will be able to

1. Analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour.
2. Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.
3. Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behaviour.
4. Analyse organizational behavioural issues in the context of organizational behaviour theories, models and concepts.

UNIT-I	INTRODUCTION TO OB	Classes: 12

Definition, Nature and Scope –Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organisational Behaviour. Cognitive Processes-I : Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization - Social perception – Attribution Theories – Locus of control –Attribution Errors –Impression Management.

UNIT-II	COGNITIVE PROCESSES-II	Classes: 14

Personality and Attitudes - Personality as a continuum – Meaning of personality - Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and

organisational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT-III	DYNAMICS OF OB-I	Classes: 10

Communication – types - interactive communication in organizations – barriers to communication and strategies to improve the follow of communication – Decision Making: Participative decision-making techniques – creativity and group decision making.

Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra-individual conflict - strategies to cope with stress and conflict.

UNIT-IV	DYNAMICS OF OB –III POWER AND POLITICS	Classes: 12

Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups –dynamics of informal groups – dysfunctions of groups and teams – teams in modern work place.

UNIT-V	LEADING HIGH PERFORMANCE	Classes: 12

Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices – Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

TEXT BOOKS

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. Mc Shane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. New strom W. John& Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e, TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective,Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e,PHI/Pearson, New Delhi, 2009.
7. Pareek Udai: Behavioural Process at Work:, Oxford & IBH, New Delhi, 2009.

REFERENCE BOOKS

1. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
2. Hitt: Organizational Behaviour, Wiley, 2008
3. Aswathappa: Organisational Behaviour, Himalaya, 2009
4. Mullins: Management and Organisational Behaviour, Pearson, 2008.
5. McShane, Glinow: Organisational Behaviour--Essentials, TMH, 2009.
6. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008.

WEB REFERENCES

1. Organizational Behaviour: https://nptel.ac.in/courses/110/105/110105034/
2. Organizational culture: https://nptel.ac.in/courses/110/105/110105033/

E -TEXT BOOKS

1. http://libgen.rs/book/index.php?md5=59EC38CD4DD8DB8517CF966E11C4F910
2. http://libgen.rs/book/index.php?md5=1122D0A4E660BF20DC7D77AF5B1BFEF8
3. http://libgen.rs/book/index.php?md5=C3F143F3AB18FDB3655D4F16EE19D718
4. http://libgen.rs/book/index.php?md5=6B8A4D77E54A79489DD71D5D2DEC49C5

MOOCS COURSES
1. https://nptel.ac.in/courses/110/106/110106145/ 2. https://nptel.ac.in/courses/110/105/110105154/ 3. https://nptel.ac.in/courses/110/105/110105033/

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Professional Elective-I	
CS511PE	Information Theory & Coding
CS512PE	Service Oriented Architecture
CS513PE	Data Analytics
CS514PE	Image Processing
CS515PE	Principles of Programming Languages
Professional Elective-II	
CS521PE	Computer Graphics
CS522PE	Blockchain Technologies
CS523PE	Informational Retrieval Systems
CS524PE	Distributed Databases
CS525PE	Natural Language Processing
Professional Elective-III	
CS611PE	Concurrent Programming
CS612PE	Web Technologies
CS613PE	Scripting Languages
CS614PE	Mobile Application Development
CS615PE	Software Testing Methodologies
Professional Elective-IV	
CS711PE	Neural Networks & Deep Learning
CS712PE	Introduction to Embedded Systems
CS713PE	Artificial Intelligence
CS714PE	Cloud Computing
CS715PE	Ad-hoc & Sensor Networks
Professional Elective-V	
CS721PE	Advanced Algorithms
CS722PE	Real Time Systems
CS723PE	Soft Computing
CS724PE	Internet of Things
CS725PE	Software Process & Project Management
Professional Elective-VI	
CS811PE	Computational Complexity
CS812PE	Distributed Systems
CS813PE	Graph Theory
CS814PE	Human Computer Interaction
CS815PE	Cyber Forensics

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

INFORMATION THEORY & CODING (Professional Elective-I)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS511PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To acquire the knowledge in measurement of information and errors.
2. Understand the importance of various codes for communication systems
3. To design encoder and decoder of various codes.
4. To known the applicability of source and channel codes

COURSE OUTCOMES

Upon completing this course, the student will be able to

1. Learn measurement of information and errors.
2. Obtain knowledge in designing various source codes and channel codes
3. Design encoders and decoders for block and cyclic codes
4. Understand the significance of codes in various applications

UNIT-I	CODING FOR RELIABLE DIGITAL TRANSMISSION AND STORAGE	Classes: 11

Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies. Source Codes: Shannon-fano coding, Huffman coding

UNIT-II	LINEAR BLOCK CODES	Classes: 13

Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT-III	CYCLIC CODES	Classes: 12

Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.		
UNIT-IV	**CONVOLUTIONAL CODES**	**Classes: 12**
Encoding of Convolutional Codes- Structural and Distance Properties, state, tree, trellis diagrams, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Sequential Decoding, Applications of Convolutional codes in ARQ system		
UNIT-V	**BCH CODES**	**Classes: 11**
Minimum distance and BCH bounds, Decoding procedure for BCH codes,Error locations polynomials for single and double error correction.		

TEXT BOOKS

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, Prentice Hall, Inc 2014.
2. Error Correcting Coding Theory-Man Young Rhee, McGraw – Hill Publishing 1989

REFERENCE BOOKS

1. Digital Communications- John G. Proakis, 5th ed., TMH 2008.
2. Introduction to Error Control Codes-Salvatore Gravano-oxford
3. Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, Wiley India.
4. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, 2009, TMH.

WEB REFERENCES

1. https://web.stanford.edu/class/ee478/references.html
2. https://www.tutorialsduniya.com/notes/introduction-to-information-theory-coding-notes/
3. https://nptel.ac.in/courses/108/108/108108168/
4. http://web.mit.edu/6.933/www/Fall2001/Shannon2.pdf

E -TEXT BOOKS

1. https://books.google.co.in/books?id=tZYdEAAAQBAJ
2. https://books.askvenkat.org/information-theory-coding-books/
3. https://www.kopykitab.com/Information-Theory-and-Coding-Notes-eBook
4. https://www.cl.cam.ac.uk/teaching/0809/InfoTheory/InfoTheoryLectures.pdf

MOOCS COURSES

1. https://web.iitd.ac.in/~rbose/initiative/MOOCS.pdf
2. http://etsc.iitd.ac.in/pdf_files/MOOCs%20IIT%20ETSC.pdf

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SERVICE ORIENTED ARCHITECTURE (Professional Elective-I)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS512PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To learn fundamentals of XML
2. To provide an overview of Service Oriented Architecture and Web services and their importance
3. To learn web services standards and technologies
4. To learn service oriented analysis and design for developing SOA based applications

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Understand XML technologies
2. Understand service orientation, benefits of SOA
3. Understand web services and WS standards
4. Use web services extensions to develop solutions
5. Understand and apply service modeling, service oriented analysis and design forapplication development

UNIT-I	XML	Classes: 12

XML document structure – Well-formed and valid documents – DTD – XML Schema – Parsing XML using DOM, SAX – XPath - XML Transformation and XSL – Xquery

UNIT-II	SERVICE ORIENTED ARCHITECTURE (SOA) BASICS	Classes: 12

Characteristics of SOA, Benefits of SOA , Comparing SOA with Client-Server and Distributed architectures –-- Principles of Service Orientation – Service layers

UNIT-III	WEB SERVICES (WS) AND STANDARDS	Classes: 10
Web Services Platform – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI – Service-Level Interaction Patterns – Orchestration and Choreography		

UNIT-IV	WEB SERVICES EXTENSIONS	Classes: 12
WS-Addressing - WS-ReliableMessaging - WS-Policy – WS-Coordination – WS - Transactions - WS-Security - Examples.		
UNIT-V	**SERVICE ORIENTED ANALYSIS AND DESIGN**	**Classes: 12**
SOA delivery strategies – Service oriented analysis – Service Modelling – Service oriented design – Standards and composition guidelines -- Service design – Business process design – Case Study		

TEXT BOOKS

1. Thomas Erl, ― Service Oriented Architecture: Concepts, Technology, and Design‖, Pearson Education, 2005
2. Sandeep Chatterjee and James Webber, ―Developing Enterprise Web Services: An Architect's Guide‖, Prentice Hall, 2004

REFERENCE BOOKS

1. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, ―Java Web Services Architecture‖, Elsevier, 2003.
2. Ron Schmelzer et al. ― XML and Web Services‖, Pearson Education, 2002.
3. Frank P.Coyle, ―XML, Web Services and the Data Revolution‖, Pearson Education, 2002

WEB REFERENCES

1. https://www.ncertbooks.guru/ serviceoriented architecture /
2. https://www.mastersindatascience.org/learning/what-is- service oriented architecture /
3. https://nptel.ac.in/noc/courses/noc17/SEM2/soa17-mg24/
4. https://www.nptel.ac.in/courses/110/106/220406034/

E -TEXT BOOKS

1. https://www.datapine.com/blog/ serviceorientedarchitecture -books/
2. https://files.eric.ed.gov/fulltext/ED536788.pdf

MOOCS COURSES

1. https://www.mooc-list.com/tags/data-analytics
2. https://www.mooc-course.com/subject/data-science/data-analysis/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATA ANALYTICS (Professional Elective-I)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS513PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To explore the fundamental concepts of data analytics.
2. To learn the principles and methods of statistical analysis
3. Discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
4. To understand the various search methods and visualization techniques.

COURSE OUTCOMES

After completion of this course students will be able to

1. Understand the impact of data analytics for business decisions and strategy
2. Carry out data analysis/statistical analysis
3. To carry out standard data visualization and formal inference procedures
4. Design Data Architecture
5. Understand various Data Sources

UNIT-I	DATA MANAGEMENT	Classes: 12

Design Data Architecture and manage the data for analysis, understand various sources of Data like Sensors/Signals/GPS etc. Data Management, Data Quality (noise, outliers, missing values, duplicate data) and Data Processing & Processing.

UNIT-II	DATA ANALYTICS	Classes: 11

Introduction to Analytics, Introduction to Tools and Environment, Application of Modeling in Business, Databases & Types of Data and variables, Data Modeling Techniques.

UNIT-III	REGRESSION – CONCEPTS	Classes: 12

Blue property assumptions, Least Square Estimation, Variable Rationalization, and Model Building etc. Logistic Regression: Model Theory, Model fit Statistics, Model Construction, Analytics applications to various Business Domains etc.		
UNIT-IV	**OBJECT SEGMENTATION**	**Classes: 14**
Regression Vs Segmentation – Supervised and Unsupervised Learning, Tree Building – Regression, Classification, Overfitting, Pruning and Complexity, Multiple Decision Trees etc. Time Series Methods: Arima, Measures of Forecast Accuracy, STL approach, Extract features from generated model as Height, Average Energy etc and Analyze for prediction		
UNIT-V	**DATA VISUALIZATION**	**Classes: 11**
Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Relations.		

TEXT BOOKS

1. Student's Handbook for Associate Analytics – II, III.
2. Data Mining Concepts and Techniques, Han, Kamber, 3rd Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addision Wisley, 2006.
2. Data Mining Analysis and Concepts, M. Zaki and W. Meira
3. Mining of Massive Datasets, Jure Leskovec Stanford Univ. Anand Rajaraman Milliway Labs Jeffrey D Ullman Stanford Univ.

WEB REFERENCES

1. https://www.ncertbooks.guru/big-data-analytics/
2. https://www.mastersindatascience.org/learning/what-is-data-analytics/
3. https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-mg24/
4. https://www.nptel.ac.in/courses/110/106/110106072/

E -TEXT BOOKS

1. https://www.datapine.com/blog/best-big-data-and-data-analytics-books/
2. https://files.eric.ed.gov/fulltext/ED536788.pdf

MOOCS COURSES

1. https://www.mooc-list.com/tags/data-analytics
2. https://www.mooc-course.com/subject/data-science/data-analysis/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

IMAGE PROCESSING (Professional Elective-I)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS514PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Provide a theoretical and mathematical foundation of fundamental Digital Image Processing concepts.
2. The topics include image acquisition; sampling and quantization; pre-processing; enhancement; restoration; segmentation; and compression.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
2. Demonstrate the knowledge of filtering techniques.
3. Demonstrate the knowledge of 2D transformation techniques.
4. Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques

UNIT-I	DIGITAL IMAGE FUNDAMENTALS	Classes: 15

Digital Image through Scanner, Digital Camera. Concept of Gray Levels. Gray Level to Binary Image Conversion. Sampling and Quantization. Relationship between Pixels. Imaging Geometry. 2D Transformations-DFT, DCT, KLT and SVD.

UNIT-II	IMAGE ENHANCEMENT	Classes: 12

Image Enhancement in Spatial Domain Point Processing, Histogram Processing, Spatial Filtering, Enhancement in Frequency Domain, Image Smoothing, Image Sharpening.

UNIT-III	IMAGE RESTORATION	Classes: 12

Image Restoration Degradation Model, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT-IV	IMAGE SEGMENTATION	Classes: 11

Image Segmentation Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region Oriented Segmentation.

UNIT-V	IMAGE COMPRESSION	Classes: 12

Image Compression Redundancies and their Removal Methods, Fidelity Criteria, Image Compression Models, Source Encoder and Decoder, Error Free Compression, Lossy Compression.

TEXT BOOKS

1. Digital Image Processing: R.C. Gonzalez & R. E. Woods, Addison Wesley/ Pearson Education, 2nd Ed, 2004.

REFERENCE BOOKS

1. Fundamentals of Digital Image Processing: A. K. Jain, PHI.
2. Digital Image Processing using MAT LAB: Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins: Pearson Education India, 2004.
3. Digital Image Processing: William K. Pratt, John Wilely, 3rd Edition, 2004.

WEB REFERENCES

1. https://www.ijert.org/image-processing-using-web-2-0-2
2. https://iopscience.iop.org/article/10.1088/1742-6596/1087/5/052024/pdf
3. https://en.wikipedia.org/wiki/Digital_image_processing

E -TEXT BOOKS

1. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%203rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf
2. https://sisu.ut.ee/imageprocessing/book/1

MOOCS COURSES

1. http://nptel.ac.in
2. https://www.coursera.org2.

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DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

PRINCIPLES OF PROGRAMMING LANGUAGES (Professional Elective-I)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS515PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Introduce important paradigms of programming languages
2. To provide conceptual understanding of high-level language design and implementation
3. Topics include programming paradigms; syntax and semantics; data types, expressions statements; subprograms and blocks; abstract data types; concurrency; functional and logic programming languages; and scripting languages

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Acquire the skills for expressing syntax and semantics in formal notation
2. Identify and apply a suitable programming paradigm for a given computing application
3. Gain knowledge of and able to compare the features of various programming languages
4. Create subprograms and statement blocks through various programming languages
5. apply knowledge in logical programming languages and scripting languages

UNIT-I	Preliminary Concepts, Syntax and Semantics	Classes: 12

Preliminary Concepts: Reasons for Studying Concepts of Programming Languages, Programming Domains, Language Evaluation Criteria, Influences on Language Design, Language Categories, Language Design Trade-Offs, Implementation Methods, Programming Environments

Syntax and Semantics: General Problem of Describing Syntax and Semantics, Formal Methods of Describing Syntax, Attribute Grammars, Describing the Meanings of Programs

UNIT-II	Names, Bindings, Scopes, Data types, Expressions, statements, and control structures	Classes: 12

Names, Bindings, and Scopes: Introduction, Names, Variables, Concept of Binding, Scope, Scope and Lifetime, Referencing Environments, Named Constants

Data Types: Introduction, Primitive Data Types, Character String Types, User Defined Ordinal Types, Array, Associative Arrays, Record, Union, Tuple Types, List Types, Pointer and Reference Types, Type Checking, Strong Typing, Type Equivalence

Expressions and Statements: Arithmetic Expressions, Overloaded Operators, Type Conversions, Relational and Boolean Expressions, Short Circuit Evaluation, Assignment Statements, Mixed-Mode Assignment

Control Structures – Introduction, Selection Statements, Iterative Statements, Unconditional Branching, Guarded Commands.

UNIT-III	Subprograms, Blocks, Implementing Subprograms and Abstract Data Types	Classes: 12

Subprograms and Blocks: Fundamentals of Sub-Programs, Design Issues for Subprograms, Local Referencing Environments, Parameter Passing Methods, Parameters that Are Subprograms, Calling Subprograms Indirectly, Overloaded Subprograms, Generic Subprograms, Design Issues for Functions, User Defined Overloaded Operators, Closures, Coroutines.

Implementing Subprograms: General Semantics of Calls and Returns, Implementing Simple Subprograms, Implementing Subprograms with Stack-Dynamic Local Variables, Nested Subprograms, Blocks, Implementing Dynamic Scoping

Abstract Data Types: The Concept of Abstraction, Introductions to Data Abstraction, Design Issues, Language Examples, Parameterized ADT, Encapsulation Constructs, Naming Encapsulations

UNIT - IV	Concurrency and Exception Handling and Event Handling	Classes: 11

Concurrency: Introduction, Introduction to Subprogram Level Concurrency, Semaphores, Monitors, Message Passing, Java Threads, Concurrency in Function Languages, Statement Level Concurrency.

Exception Handling and Event Handling: Introduction, Exception Handling in Ada, C++, Java, Introduction to Event Handling, Event Handling with Java and C#.

UNIT-V	Functional, Logic and Scripting programming Languages	Classes: 12

Functional Programming Languages: Introduction, Mathematical Functions, Fundamentals of Functional Programming Language, LISP, Support for Functional Programming in Primarily Imperative Languages, Comparison of Functional and Imperative Languages

Logic Programming Language: Introduction, an Overview of Logic Programming, Basic Elements of Prolog, Applications of Logic Programming.

Scripting Language: Pragmatics, Key Concepts, Case Study: Python – Values and Types, Variables, Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library. (Text Book 2)

TEXT BOOKS

1. Concepts of Programming Languages Robert. W. Sebesta 10/E, Pearson Education.
2. Programming Language Design Concepts, D. A. Watt, Wiley Dreamtech, 2007.

REFERENCE BOOKS

1. Programming Languages, 2nd Edition, A.B. Tucker, R. E. Noonan, TMH.
2. Programming Languages, K. C. Louden, 2nd Edition, Thomson, 2003

WEB REFERENCES

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://cvr.ac.in/cse/stud/NOTES/PPL/PPL.pdf
2. https://csd.cmu.edu/academics/undergraduate/principles_of_programming_languages_concentration

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

COMPUTER GRAPHICS (Professional Elective-II)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS521PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics
2. Understand the importance of various codes for computer graphics systems
3. To design computer graphics of various codes.
4. To known the applicability of include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection

COURSE OUTCOMES

Upon completing this course, the student will be able to

1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications

UNIT-I	COMPUTER GRAPHICS AND OUTPUT PRIMITIVES, POLYGON FILLING	Classes: 11

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), mid- point circle and ellipse algorithms

Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT-II	2-D GEOMETRICAL TRANSFORMS AND 2-D VIEWING	Classes: 13

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgemanpolygon clipping algorithm.

UNIT-III	3-D OBJECT REPRESENTATION	Classes: 12

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT-IV	3-D GEOMETRIC TRANSFORMATIONS AND 3-D VIEWING	Classes: 12

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

UNIT-V	COMPUTER ANIMATION AND VISIBLE SURFACE DETECTION METHODS	Classes: 11

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

TEXT BOOKS

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

WEB REFERENCES

1. https://web.stanford.edu/class/ee478/references.html
2. https://www.tutorialsduniya.com/notes/introduction-to-computer graphics-notes/
3. https://nptel.ac.in/courses/108/108/108108168/
4. http://web.mit.edu/6.933/www/Fall2001/Shannon2.pdf

E -TEXT BOOKS
1. https://books.google.co.in/books?id=tZYdEAAAQBAJ 2. https://books.askvenkat.org/computer graphics -books/ 3. https://www.kopykitab.com/ computer graphics -Notes-eBook 4. https://www.cl.cam.ac.uk/teaching/0813/computer graphics .pdf
MOOCS COURSES
1. https://web.iitd.ac.in/~rbose/initiative/MOOCS.pdf 2. http://etsc.iitd.ac.in/pdf_files/MOOCs%20IIT%20ETSC.pdf

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

BLOCKCHAIN TECHNOLOGIES (Professional Elective-II)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS522PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To Learn

1. To enable the student to understand and appreciate, the importance of fundamentals of blockchain technology and application of cryptography in blockchain.
2. To gain the awareness about the concepts of various implementations of Blockchain technology such as bitcoin, Ethereum, and Hyperledger.
3. The learner will explore various aspects of Blockchain technology like application in various domains.
4. By implementing learner will have idea about private and public Blockchain, and smart contract.
5. To provide conceptual understanding of how Blockchain technology can be used to innovate and improve business processes.

COURSE OUTCOMES

1. Understand and explore the working of Blockchain technology
2. Analyze the working of smart contracts.
3. Understand and analyse the working of hyperledger.
4. Apply the learning of solidity and de-centralized apps on ethereum.
5. Perform a transaction in bitcoin testnets.

UNIT-I	INTRODUCTION TO BLOCKCHAIN TECHNOLOGY	Classes: 15

Distributed systems – The history of blockchain– Introduction to blockchain – CAP theorem and blockchain – Benefits and limitations of blockchain – Decentralization using blockchain - Methods of decentralization – Routes to Decentralization.

UNIT-II	CRYPTOGRAPHY IN BLOCKCHAIN	Classes: 12
Introduction – cryptographic primitives – Asymmetric cryptography – public and private keys -line interface – Bitcoin improvement proposals (BIPs) – Consensus Algorithms.		
UNIT-III	**BITCOIN**	**Classes: 12**
Introduction – Transactions – Structure - Transactions types – The structure of a block– The genesis block – The bitcoin network– Wallets and its types– Bitcoin payments–Bitcoin investment and buying and selling bitcoins – Bitcoin installation – Bitcoin programming and the command-line interface – Bitcoin improvement proposals (BIPs).		
UNIT-IV	**ETHEREUM**	**Classes: 11**
Ethereum blockchain- Elements of the Ethereum blockchain– Precompiled contracts – Accounts and its types – Block header- Ether – Messages – Mining - Clients and wallets – Trading and investment – The yellow paper - The Ethereum network - Applications developed on Ethereum - Scalability and security issues.		
UNIT-V	**SMART CONTRACT AND HYPERLEDGER**	**Classes: 12**
History of Smart Contract – Ricardian contracts – The DAO. Hyperledger projects - Hyperledger as a protocol – Fabric - Hyperledger Fabric –Sawtooth lake – Corda Architecture.		

TEXT BOOKS

1. I. Bashir, Mastering Blockchain: Distributed ledger technology, decentralization, and smart contracts explained, 2nd Revised edition. Birmingham: Cryptography in Blockchain Packet Publishing,2018.

REFERENCE BOOKS

1. A. M. Antonopoulos, Mastering bitcoin, First edition. Sebastopol CA: O'Reilly, 2015.
2. Z. Zheng, S. Xie, H. Dai, X. Chen, and H. Wang, "An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends," in 2017 IEEE International Congress on Big Data (BigData Congress), 2017, pp.557–564.

WEB REFERENCES

1. Procedural elements for Computer Graphics, David F Rogers, Tata McGraw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, ShaliniGovil, Pai, 2005, Springer.

E-TEXT BOOKS

1. https://www.buffalo.edu/content/dam/www/ubblockchain/files/basics/001%20What%20is%20Blockchain.pdf
2. https://www.marshmclennan.com/content/dam/mmc-web/insights/publications/2019/jan/gl-2019-blockchain-101-overview-mercer.pdf

MOOCS COURSES
1. https://onlinecourses-archive.nptel.ac.in 2. https://swayam.gov.in/ 3. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

INFORMATIONAL RETRIEVAL SYSTEMS (Professional Elective-II)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS523PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To learn the important concepts and algorithms in IRS
2. To understand the data/file structures that are necessary to design, and implement information retrieval (IR) systems.
3. To explore the fundamental concepts of algorithms in IRS
4. To learn the principles and methods of algorithms in IRS

COURSE OUTCOMES

After completion of this course students will be able to

1. Ability to apply IR principles to locate relevant information large collections of data.
2. Ability to design different document clustering algorithms.
3. Implement retrieval systems for web search tasks.
4. Design an Information Retrieval System for web search tasks.

UNIT-I	INTRODUCTION TO INFORMATION RETRIEVAL SYSTEMS	Classes: 12

Introduction to Information Retrieval Systems: Definition of Information Retrieval System, Objectives of Information Retrieval Systems, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses Information Retrieval System Capabilities: Search Capabilities, Browse Capabilities, Miscellaneous Capabilities

UNIT-II	CATALOGING AND INDEXING AND DATA STRUCTURE	Classes: 11

Cataloging and Indexing: History and Objectives of Indexing, Indexing Process, Automatic Indexing, Information Extraction

Data Structure: Introduction to Data Structure, Stemming Algorithms, Inverted File Structure, N-Gram Data Structures, PAT Data Structure, Signature File Structure,

Hypertext and XML Data Structures, Hidden Markov Models		
UNIT-III	**AUTOMATIC INDEXING AND DOCUMENT AND TERM CLUSTERING**	**Classes: 11**
Automatic Indexing: Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages Document and Term Clustering: Introduction to Clustering, Thesaurus Generation, Item Clustering, Hierarchy of Clusters		
UNIT-IV	**USER SEARCH TECHNIQUES AND INFORMATION VISUALIZATION**	**Classes: 14**
User Search Techniques: Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the INTERNET and Hypertext Information Visualization: Introduction to Information Visualization, Cognition and Perception, Information Visualization Technologies		
UNIT-V	**TEXT SEARCH ALGORITHMS AND MULTIMEDIA INFORMATION RETRIEVAL**	**Classes: 11**
Text Search Algorithms: Introduction to Text Search Techniques, Software Text Search Algorithms, Hardware Text Search Systems Multimedia Information Retrieval: Spoken Language Audio Retrieval, Non-Speech Audio Retrieval, Graph Retrieval, Imagery Retrieval, Video Retrieval.		

TEXT BOOKS

1. Information Storage and Retrieval Systems – Theory and Implementation, Second Edition, Gerald J. Kowalski, Mark T. Maybury, Springer

REFERENCE BOOKS

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.
3. Modern Information Retrieval By Yates and Neto Pearson Education.

WEB REFERENCES

1. https://books.google.co.in/books?id=tZYdEDDDDQBAJ
2. https://books.askvenkat.org/irs-books/
3. https://www.kopykitab.com/irs-Notes-eBook
4. https://www.cl.cam.ac.uk/teaching/0809/irs/irs.pdf

E -TEXT BOOKS

1. https://www.datapine.com/blog/best-Information Retrieval Systems /-books/

2. https://files.eric.ed.gov/fulltext/ED536788.pdf
MOOCS COURSES
1. https://www.mooc-list.com/tags/ Information Retrieval Systems 2. https://www.mooc-course.com/subject/ Information Retrieval Systems /

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DISTRIBUTED DATABASES (Professional Elective-II)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS524PE	B. Tech	3	0	0	3	30	70	100

PREREQUISITES:

1. A course on "Database Management Systems"

COURSE OBJECTIVES

1. The purpose of the course is to enrich the previous knowledge of database systems and exposing the need for distributed database technology to confront with the deficiencies of the centralized database systems
2. Introduce basic principles and implementation techniques of distributed database systems.
3. Equip students with principles and knowledge of parallel and object-oriented databases.
4. Topics include distributed DBMS architecture and design; query processing and optimization; distributed transaction management and reliability; parallel and object database management systems.
5. Identify transaction in distributed environment and associated to namely, concurrency control, deadlocks and error recovery.

COURSE OUTCOMES

1. Understand theoretical and practical aspects of distributed database systems.
2. Study and identify various issues related to the development of distributed database system.
3. Understand the design aspects of object-oriented database system and related development.
4. Categorize the concepts of distributed file systems, distributed shared memory.
5. Elaborate transactions and concurrency control in distributed systems.

UNIT-I	INTRODUCTIONDISTRIBUTED DATABASES	Classes: 18

Introduction; Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS, DDMBS Architecture.

Distributed Database Design: Alternative Design Strategies, Distribution Design issues,

Fragmentation, Allocation.

UNIT-II	QUERY PROCESSING AND DECOMPOSITION	Classes: 14

Query processing and decomposition: Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data, distributed debugging.

Distributed query Optimization: Query optimization, centralized query optimization, distributed query optimization algorithms.

UNIT-III	TRANSACTION MANAGEMENT	Classes: 13

Transaction Management: Definition, properties of transaction, types of transactions, **distributed concurrency control**: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management, RPC.

UNIT-IV	DISTRIBUTED DBMS RELIABILITY	Classes: 11

Distributed DBMS Reliability: Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

Parallel Database Systems: Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

UNIT-V	DISTRIBUTED OBJECT DATABASE MANAGEMENT SYSTEMS	Classes: 11

Distributed object Database Management Systems: Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.

Object Oriented Data Model: Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS, Distributed deadlocks, Transaction recovery

TEXT BOOKS

1. M. Tamer OZSU and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edn. Asia, 2001.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

REFERENCE BOOKS

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: “Database Systems: The Complete Book”, Second Edition, Pearson International Edition

WEB REFERENCES

1.https://vulms.vu.edu.pk/Courses/CS712/Downloads/Principles%20of%20Distributed%20Database%20Systems.pdf

2.https://files.eric.ed.gov/fulltext/ED536788.pdf
MOOCS
1.https://www.mooc-list.com/tags/database%distributed%databases 2.https://www.mooc-course.com/subject/database/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

NATURAL LANGUAGE PROCESSING (Professional Elective-II)

III B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS525PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To understand the basic concepts and the applications of natural Language Processing.
2. To master the basics of natural Language Processing.
3. Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms
5. Able to design different language modeling Techniques.

UNIT-I	INTRODUCTIONTO NATURAL LANGUAGE PROCESSING.	Classes: 12

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models

Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches

UNIT-II	SYNTAX ANALYSIS AND TREEBANKS	Classes: 12

Syntax Analysis: Parsing Natural Language,

Tree banks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing,Multilingual Issues

UNIT-III	SEMANTIC PARSING	Classes: 10
Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.		
UNIT-IV	**PREDICATE-ARGUMENT STRUCTURE**	**Classes: 12**
Predicate-Argument Structure, Meaning Representation Systems, Software		
UNIT-V	**DISCOURSE PROCESSING AND LANGUAGE MODELING**	**Classes: 12**
Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure **Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Cross lingual Language Modeling		

TEXT BOOKS

1. Multilingual natural Language Processing Applications: From Theory to Practice Daniel M. Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S.Tiwary

REFERENCE BOOKS

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.

WEB REFERENCES

1. http://www.freebookcentre.net/Free- natural Language Processing.-Books-Download.html
2. https://www.gatevidyalay.com/ natural Language Processing./

E -TEXT BOOKS

1. http://www.ebooks-for-all.com/bookmarks/detail/ natural Language Processing. /onecat/0.html
2. http://freecomputerbooks.com/nlpBooks.html

MOOCS COURSES

1. https://swayam.gov.in/nd2_cec19_cs05/preview
2. https://swayam.gov.in/nd2_nou19_lb03/preview

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

CONCURRENT PROGRAMMING (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS611PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To explore the abstractions used in concurrent programming

1. Understand the mechanisms for communication and coordination among concurrent process.
2. Knowledge on concurrent objects.
3. Apply the knowledge on synchronization operations.
4. Analyze on linked lists.
5. Apply knowledge in concurrent queues stacks and elimination.

COURSE OUTCOMES

1. Ability to implement the mechanisms for communication and co-ordination among concurrent Processes.
2. Ability to understand and reason about concurrency and concurrent objects
3. Ability to implement the locking and non-blocking mechanisms
4. Ability to understand concurrent objects

UNIT-I	INTRODUCTION CONCURRENT PROGRAMMING	Classes: 11

Introduction - Shared Objects and Synchronization, A Fable, Properties of Mutual Exclusion, The Moral, The Producer–Consumer Problem, The Harsh Realities of Parallelization.
Mutual Exclusion - Time, Critical Sections, 2-Thread Solutions, The Peterson Lock, The Filter Lock, Lamport's Bakery Algorithm.

UNIT-II	CONCURRENT OBJECTS	Classes: 11

Concurrent Objects - Concurrency and Correctness, Sequential Objects, Quiescent consistency, Sequential Consistency, Linearizability, Linearization Points, Formal Definitions Linearizability, Compositional Linearizability, The Nonblocking Property, Progress conditions, Dependent Progress Conditions, The Java Memory Model, Locks and synchronized Blocks, Volatile Fields, Final Fields.

UNIT-III	SYNCHRONIZATION OPERATIONS	Classes: 11

Synchronization Operations, Consensus Numbers, Consensus Protocols, The CompareAndSet() Operation, Introduction Universality, A Lock-Free Universal, Construction Wait- Free Universal Construction, Spin Locks , Test-And-Set Locks		
UNIT-IV	**LINKED LISTS**	**Classes: 11**
Linked Lists: The Role of Locking, Introduction, List-Based Sets, Concurrent Reasoning, Coarse-Grained Synchronization, Fine-Grained Synchronization, Optimistic Synchronization, Lazy Synchronization, Non-Blocking Synchronization		
UNIT-V	**CONCURRENT QUEUES STACKS AND ELIMINATION**	**Classes: 11**
Concurrent Queues and the ABA Problem, Concurrent Stacks and Elimination, Transactional Memories. Concurrent Stacks and Elimination: Introduction, An Unbounded Lock-Free Stack, Elimination, The Elimination Backoff Stack, A Lock-Free Exchanger, The Elimination Array.		
TEXT BOOKS		
1. The Art of Multiprocessor Programming, by Maurice Herlihy and Nir Shavit, Morgan Kaufmman Publishers, 1st Edition, Indian Reprint 2012		
REFERENCE BOOKS		
1. Java Concurrency in Practice by Brian Goetz, Tim Peierls, Joshua Block, Joseph Bowbeer,David Holmes and Doug Lea, Addison Wesley, 1st Edition, 2006. 2. Concurrent Programming in Java™: Design Principles and Patterns, Second Edition by DougLea, Publisher: Addison Wesley, Pub Date: October 01, 1999..		
WEB REFERENCES		
1.https://www.coursera.org/learn/concurrent-programming-in-java 2.https://canvas.harvard.edu/courses/4295/assignments/syllabus		
E -TEXT BOOKS		
1. Java concurrency in practice:tim peierls,joshu blouch.		
MOOCS COURSES		
1.https://www.youtube.com/watch?v=eEecgNZHR9k 2. https://www.youtube.com/watch?v=YULn-JurfNA		

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

WEB TECHNOLOGIES (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS612PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Javascript and AJAX

COURSE OUTCOMES

1. Gain knowledge of client-side scripting, validation of forms and AJAX programming
2. Understand server-side scripting with PHP language
3. Understand what is XML and how to parse and use XML Data with Java
4. To introduce Server-side programming with Java Servlets and JSP

UNIT-I	HTML	Classes: 14

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets; XML: Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

UNIT-II	INTRODUCTION TO PHP AND FILE HANDLING IN PHP	Classes: 13

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies

File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

UNIT-III	INTRODUCTION TO SERVLETS	Classes: 13

Introduction to Servlets: Common Gateway Interface (CGt), Life cycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC		
UNIT-IV	**INTRODUCTION TO JSP**	**Classes: 14**
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP		
UNIT-V	**CLIENT-SIDE SCRIPTING**	**Classes: 12**
Client-side Scripting: Introduction to Javascript, Javascript language – declaring variables, scope of variables, functions. Event handlers (onclick, onsubmit etc.), Document Object Model, Form validation.		

TEXT BOOKS

1. Web Technologies, Uttam K Roy, Oxford University Press
2. The Complete Reference PHP — Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS

1. Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech
2. Java Server Pages —Hans Bergsten, SPD O'Reilly,
3. Java Script, D.Flanagan
4. Beginning Web Programming-Jon Duckett WROX

WEB REFERENCES

1. http://bitbucket.org/ -
2. http://github.com/ -
3. http://www.codeplex.com/ -
4. http://sourceforge.net/

E -TEXT BOOKS

1. https://www.tutorialspoint.com/php/
2. https://www.tutorialspoint.com/php/php_tutorial.pdf
3. https://www.geeksforgeeks.org/web-technology/

MOOCS COURSES

1. https://nptel.ac.in/courses/106105084/14
2. https://nptel.ac.in/courses/nptel_download.php?subjectid=106105084
3. https://freevideolectures.com/course/3690/advanced-java/29 -servlets

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SCRIPTING LANGUAGES (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS613PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. This course introduces the script programming paradigm
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Comprehend the differences between typical scripting languages and typical system and application programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Acquire programming skills in scripting language

UNIT-I	INTRODUCTION TO RUBY AND WEB	Classes: 10

Introduction: Ruby, Rails,
Ruby Fundamentals : Ruby Data Types & Variables , Functions & Control Flow , Ruby Data Structures, Classes, Controllers and Views, Models & Forms, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and webservices
RubyTk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT-II	EXTENDING RUBY	Classes: 9

Extending Ruby: Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System,Embedding Ruby to Other Languages, Embedding a Ruby Interperter

UNIT-III	INTRODUCTION TO PERL AND SCRIPTING	Classes: 10

Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines

UNIT-IV	ADVANCED PERL	Classes: 9

Finer points of looping, pack and unpack, filesystem, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

UNIT-V	INTRODUCTION TO TCL AND TK:	Classes: 11

TCL

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Programmers guide by Dabve Thomas Second edition

REFERENCE BOOKS

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

WEB REFERENCES

1. https://nptel.ac.in/courses/117/106/117106113/
2. https://www.freetechbooks.com/perl-f5.html
3. https://www.freetechbooks.com/ruby-f49.html
4. https://www.freetechbooks.com/tcltk-f47.html

E -TEXT BOOKS

1. http://www.freebookcentre.net/Language/Free-Tcl-Books-Download.html
2. http://www.freebookcentre.net/Language/Free-Perl-Books-Download.html
3. http://www.freebookcentre.net/Language/Free-Ruby-Books-Download.html

MOOCS COURSES

1. https://onlinecourses-archive.nptel.ac.in
2. https://swayam.gov.in/
3. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

MOBILE APPLICATION DEVELOPMENT (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS614PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To demonstrate their understanding of the fundamentals of Android operating systems
2. To improves their skills of using Android software development tools
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform
4. To demonstrate their ability to deploy software to mobile devices
5. To demonstrate their ability to debug programs running on mobile devices

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Student understands the working of Android OS Practically.
2. Student will be able to develop Android user interfaces
3. Student will be able to develop, deploy and maintain the Android Applications

UNIT-I	INTRODUCTION TO ANDROID OPERATING SYSTEM	Classes: 15

Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools
Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc, Resources for different devices and languages, Runtime Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT-II	ANDROID USER INTERFACE	Classes: 12

Measurements – Device and pixel density independent measuring UNIT - s Layouts – Linear, Relative, Grid and Table Layouts
User Interface (UI) Components – Editable and non-editable Text Views, Buttons,

Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers
Event Handling – Handling clicks or changes of various UI components
Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT-III	INTENTS AND BROADCASTS	Classes: 12

Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS
Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity
Notifications – Creating and Displaying notifications, Displaying Toasts

UNIT-IV	PERSISTENT STORAGE	Classes: 11

Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference

UNIT-V	DATABASE	Classes: 12

Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)

TEXT BOOKS

1. Professional Android 4 Application Development, Reto Meier, Wiley India,(Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCE BOOKS

1. Beginning Android4 Application Development, Wei-MengLee,Wiley India(Wrox),2013

WEB REFERENCES

1.https://www.tutorialspoint.com/mobile_development_tutorials.htm
2.https://www.javatpoint.com/android-tutorial

E -TEXT BOOKS

1.http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=http%3A%2F%2Fprojanco.com%2FLibrary%2FAndroid%2520App%2520Development%2520in%2520Android%2520Studio%2520%2520Java%2520plus%2520Android%2520edition%2520for%2520beginners.pdf&clen=10563468&chunk=true
2.http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.mediapiac.com%2Fuploads%2Fconference%2Fpresenters%2Fdocuments%2F17%2F8.pdf&chunk=true

MOOCS COURSES

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2. https://swayam.gov.in/
3. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SOFTWARE TESTING METHODOLOGIES (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS615PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
2. To develop skills in software test automation and management using latest tools.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Design and develop the best test strategies in accordance to the development model.

UNIT-I	INTRODUCTION	Classes: 15

Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs Flow graphs and Path testing: Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II	TRANSACTION FLOW TESTING	Classes: 12

Transaction flows, transaction flow testing techniques. Dataflow testing: Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing. Domain Testing: domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-III	PATH PRODUCTS AND REGULAR EXPRESSIONS	Classes: 12

Paths, Path products and Regular expressions: path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection.
Logic Based Testing: overview, decision tables, path expressions, kv charts, specifications.

UNIT-IV	STATE GRAPHS AND TRANSITION TESTING	Classes: 11

State, State Graphs and Transition testing: state graphs, good & bad state graphs, state testing, Testability tips

UNIT-V	GRAPH MATRICES AND APPLICATION	Classes: 12
Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools. (Student should be given an exposure to a tool like JMeter or Win-runner).		

TEXT BOOKS

1. Software Testing Techniques – Baris Beizer, Dream tech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dream tech.

REFERENCE BOOKS

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

WEB REFERENCES

1. https://www.smartzworld.com/notes/software-testing-methodologies-pdf-notes-stm-pdf-notes/
2. https://www.academia.edu/27915965/SOFTWARE_TESTING_METHODOLOGIES

E -TEXT BOOKS

1. https://examupdates.in/software-testing-methodologies/

MOOCS COURSES

1. https://onlinecourses-archive.nptel.ac.in
2. https://swayam.gov.in/
3. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

CONCURRENT PROGRAMMING LAB (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS621PE	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. Implement the mechanisms for communication and co-ordination among concurrent Processes.
2. Ability to understand and reason about concurrency and concurrent objects
3. Ability to implement the locking and non-blocking mechanisms

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to implement the mechanisms for communication and co-ordination among concurrent Processes.
2. Ability to understand and reason about concurrency and concurrent objects
3. Ability to implement the locking and non-blocking mechanisms
4. Ability to understand concurrent objects

LIST OF EXPERIMENTS

1. Design and implement Two-thread mutual exclusion algorithm (Peterson's Algorithm) using multithreaded programming.
2. Design and implement Filter Lock algorithm and check for deadlock-free and starvation free conditions using multithreaded programming.
3. Design and implement Lamport's Bakery Algorithm and check for deadlock-free and starvation free conditions using multithreaded programming.
4. Design and implement Lock-based concurrent FIFO queue data structure using multithreaded programming.
5. Design a consensus object using read–write registers by implementing a deadlock-free or starvation-free mutual exclusion lock. (Use Compare And Set( ) Primitive).
6. Design and implement concurrent List queue data structure using multithreaded programming.(Use Atomic Primitives)
7. Design and implement concurrent Stack queue data structure using multithreaded programming.(Use Atomic Primitives)

8. Design and implement concurrent FIFO queue data structure using multithreaded programming. (Use Atomic Primitives)

TEXT BOOKS

1. The Art of Multiprocessor Programming, by Maurice Herlihy and Nir Shavit, Morgan Kaufmman Publishers, 1st Edition, Indian Reprint 2012

REFERENCE BOOKS

1. Java Concurrency in Practice by Brian Goetz, Tim Peierls, Joshua Block, Joseph Bowbeer, David Holmes and Doug Lea, Addison Wesley, 1st Edition, 2006.
2. Concurrent Programming in Java™: Design Principles and Patterns, Second Edition by Doug Lea, Publisher: Addison Wesley, Pub Date: October 01, 1999.

WEB REFERENCES

1.https://www.coursera.org/learn/concurrent-programming-in-java

2.https://canvas.harvard.edu/courses/4295/assignments/syllabus

E -TEXT BOOKS

1. java concurrency in practice:tim peierls,joshu blouch

MOOCS COURSES

1.https://onlinecourses-archive.nptel.ac.in

2.https://swayam.gov.in/

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DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

WEB TECHNOLOGIES LAB (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS622PE	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To introduce PHP language for server-side scripting
2. To introduce XML and processing of XML Data with Java
3. To introduce Server-side programming with Java Servlets and JSP
4. To introduce Client-side scripting with Javascript and AJAX

COURSE OUTCOMES

1. Gain knowledge of client-side scripting, validation of forms and AJAX programming
2. Understand server-side scripting with PHP language
3. Understand what is XML and how to parse and use XML Data with Java
4. To introduce Server-side programming with Java Servlets and JSP

LIST OF EXPERIMENTS

1. Write a PHP script to print prime numbers between 1-50.
2. PHP script to
   a. Find the length of a string.
   b. Count no of words in a string.
   c. Reverse a string.
   d. Search for a specific string.
3. Write a PHP script to merge two arrays and sort them as numbers, in descending order.
4. Write a PHP script that reads data from one file and write into another file.
5. Develop static pages (using Only HTML) of an online book store. The pages should resemble: www.amazon.com. The website should consist the following pages.
   a. Home page
   b. Registration and user Login
   c. User Profile Page
   d. Books catalog
   e. Shopping Cart

f. Payment By credit card

g. Order Conformation

6. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.

7. Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.

8. Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

9. Redo the previous task using JSP by converting the static web pages of assignments 2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

TEXT BOOKS

1. WEB TECHNOLOGIES: A Computer Science Perspective, Jeffrey C. Jackson, Pearson Education

REFERENCE BOOKS

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. J2EE: The complete Reference By James Keogh, McGraw-Hill
3. Bai and Ekedhi, The Web Warrior Guide to Web Programming, Thomson
4. Paul Dietel and Harvey Deitel," Java How to Program", Prentice Hall of India, 8th Edition
5. Web technologies, Black Book, Dreamtech press.
6. Gopalan N.P. and Akilandeswari J., "Web Technology", Prentice Hall of India

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1.http://bitbucket.org/ -

2.http://github.com/ -

3.http://www.codeplex.com/ -

4.http://sourceforge.net/

E -TEXT BOOKS

1.https://www.tutorialspoint.com/php/

2. https://www.tutorialspoint.com/php/php_tutorial.pdf

3. https://www.geeksforgeeks.org/web-technology/

MOOCS COURSES

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2.https://swayam.gov.in/

3.https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SCRIPTING LANGUAGES LAB (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS623PE	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1.To Understand the concepts of scripting languages for developing web based projects

2.To understand the applications the of Ruby, TCL, Perl scripting languages

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand the differences between scripting languages and programminglanguages.
2. Able to gain some fluency programming in Ruby, Perl, TCL

LIST OF EXPERIMENTS

1. Write a Ruby script to create a new string which is n copies of a given string where n is a nonnegative integer
2. Write a Ruby script which accept the radius of a circle from the user and compute the parameter and area.
3. Write a Ruby script which accept the user's first and last name and print them in reverse order with a space between them
4. Write a Ruby script to accept a filename from the user print the extension of that
5. Write a Ruby script to find the greatest of three numbers
6. Write a Ruby script to print odd numbers from 10 to 1
7. Write a Ruby script to check two integers and return true if one of them is 20 otherwise return their sum
8. Write a Ruby script to check two temperatures and return true if one is less than 0 and the other is greater than 100

9. Write a Ruby script to print the elements of a given array
10. Write a Ruby program to retrieve the total marks where subject name and marks of a student stored in a hash
11. Write a TCL script to find the factorial of a number
12. Write a TCL script that multiplies the numbers from 1 to 10
13. Write a TCL script for Sorting a list using a comparison function
14. Write a TCL script to (i)create a list (ii)append elements to the list (iii)Traverse the list (iv)Concatenate the list
15. Write a TCL script to comparing the file modified times.
16. Write a TCL script to Copy a file and translate to native format.
17. a) Write a Perl script to find the largest number among three numbers.
    b) Write a Perl script to print the multiplication tables from 1-10 using subroutines.
18. Write a Perl program to implement the following list of manipulating functions
    a)Shift
    b)Unshift
    c)Push
19. a) Write a Perl script to substitute a word, with another word in a string.
    b) Write a Perl script to validate IP address and email address.
20. Write a Perl script to print the file in reverse order using command line arguments

TEXT BOOKS

1. The World of Scripting Languages, David Barron,Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Progammers guide by Dabve Thomas Second edition

REFERENCE BOOKS

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J. Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J. P. Flynt, Cengage Learning.

WEB REFERENCES

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2.https://www.freetechbooks.com/perl-f5.html
3.https://www.freetechbooks.com/ruby-f49.html
4.https://www.freetechbooks.com/tcltk-f47.html

E -TEXT BOOKS

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2.http://www.freebookcentre.net/Language/Free-Perl-Books-Download.html
3.http://www.freebookcentre.net/Language/Free-Ruby-Books-Download.html

MOOCS COURSES

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2.https://swayam.gov.in/
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DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

MOBILE APPLICATION DEVELOPMENT LAB (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS624PE	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

1. To demonstrate their understanding of the fundamentals of Android operating systems
2. To improves their skills of using Android software development tools
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform
4. To demonstrate their ability to deploy software to mobile devices
5. To demonstrate their ability to debug programs running on mobile devices

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Student understands the working of Android OS Practically.
2. Student will be able to develop Android user interfaces
3. Student will be able to develop, deploy and maintain the Android Applications

LIST OF EXPERIMENTS

1. Create an Android application that shows Hello + name of the user and run it on an emulator.

(b) Create an application that takes the name from a text box and shows hello message along
with the name entered in text box, when the user clicks the OK button.

2. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric), Date of Birth (Date Picket), State (Spinner) and a Submit button. On clicking the submit button, print all the data below the Submit Button. Use (a) Linear Layout (b) Relative Layout and (c) Grid Layout or Table Layout.

3. Develop an application that shows names as a list and on selecting a name it should show the details of the candidate on the next screen with a “Back” button. If the screen is rotated to landscape mode (width greater than height), then the screen should show list on left fragment and details on right fragment instead of second screen with back

button. Use Fragment transactions and Rotation event listener.

4. Develop an application that uses a menu with 3 options for dialing a number, opening a website and to send an SMS. On selecting an option, the appropriate action should be invoked using intents.

5. Develop an application that inserts some notifications into Notification area and whenever a notification is inserted, it should show a toast with details of the notification.

6. Create an application that uses a text file to store user names and passwords (tab separated fields and one record per line). When the user submits a login name and password through a screen, the details should be verified with the text file data and if they match, show a dialog saying that login is successful. Otherwise, show the dialog with Login Failed message.

7. Create a user registration application that stores the user details in a database table.

8. Create a database and a user table where the details of login names and passwords are stored. Insert some names and passwords initially. Now the login details entered by the user should be verified with the database and an appropriate dialog should be shown to the user.

9. Create an admin application for the user table, which shows all records as a list and the admin can select any record for edit or modify. The results should be reflected in the table.

10. Develop an application that shows all contacts of the phone along with details like name, phone number, mobile number etc.

11. Create an application that saves user information like name, age, gender etc. in shared preference and retrieves them when the program restarts.

12. Create an alarm that rings every Sunday at 8:00 AM. Modify it to use a time picker to set alarm time.

13. Create an application that shows the given URL (from a text field) in a browser.

TEXT BOOKS

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCE BOOKS

1. Beginning Android4 Application Development, Wei-MengLee, Wiley India(Wrox),2013

WEB REFERENCES

1.https://www.tutorialspoint.com/mobile_development_tutorials.htm

2.https://www.javatpoint.com/android-tutorial

E -TEXT BOOKS

1.http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=http%3A%2F%2Fprojanco.com%2FLibrary%2FAndroid%2520App%2520Development%2520in%2520Android%2520Studio%2520%2520Java%2520plus%2520Android%2520edition%2520for%252

0beginners.pdf&clen=10563468&chunk=true 2.http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.mediapiac.com%2Fuploads%2Fconference%2Fpresenters%2Fdocuments%2F17%2F8.pdf&chunk=true
MOOCS COURSES
1.https://onlinecourses-archive.nptel.ac.in 2.https://swayam.gov.in/ 3.https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SOFTWARE TESTING METHODOLOGIES LAB (Professional Elective - III)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS625PE	B. Tech	0	0	3	1.5	30	70	100

COURSE OBJECTIVES

To learn

1. To provide knowledge of Software Testing Methods.

2. To develop skills in software test automation and management using latest tools.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Design and develop the best test strategies in accordance to the development model

LIST OF EXPERIMENTS

1. Recording in context sensitive mode and analog mode
2. GUI checkpoint for single property
3. GUI checkpoint for single object/window
4. GUI checkpoint for multiple objects
5. a) Bitmap checkpoint for object/window
   b) Bitmap checkpoint for screen area
6. Database checkpoint for Default check
7. Database checkpoint for custom check
8. Database checkpoint for runtime record check
9. a) Data driven test for dynamic test data submission
   b) Data driven test through flat files
   c) Data driven test through front grids
   d) Data driven test through excel test
10. a) Batch testing without parameter passing
    b) Batch testing with parameter passing
11. Data driven batch
12. Silent mode test execution without any interruption

13. Test case for calculator in windows application

TEXT BOOKS

1. Software Testing techniques - BarisBeizer, Dreamtech, second edition.
2. Software Testing Tools – Dr. K. V. K. K. Prasad, Dreamtech.

REFERENCE BOOKS

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

WEB REFERENCES

1.https://www.smartzworld.com/notes/software-testing-methodologies-pdf-notes-stm-pdf-notes/

2.https://www.academia.edu/27915965/SOFTWARE_TESTING_METHODOLOGIES

E -TEXT BOOKS

1.https://examupdates.in/software-testing-methodologies/

MOOCS COURSES

1.https://onlinecourses-archive.nptel.ac.in

2.https://swayam.gov.in/

3.https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

NEURAL NETWORKS & DEEP LEARNING (Professional Elective-IV)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS711PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To Learn

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To learn various types of Artificial Neural Networks
4. To gain knowledge to apply optimization strategies learn

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand the concepts of Neural Networks
2. Ability to select the Learning Networks in modelling real world systems
3. Ability to use an efficient algorithm for Deep Models
4. Ability to apply optimization strategies for large scale applications•

UNIT-I	ARTIFICIAL NEURAL NETWORKS INTRODUCTION	Classes: 10

Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Preceptor Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks.

UNIT-II	UNSUPERVISED LEARNING NETWORK	Classes: 10

Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming
Network, Kohonen Self-Organizing Feature Maps, Learning Vector Quantization, Counter Propagation Networks, Adaptive Resonance Theory Networks. Special Networks-Introduction to various networks.

UNIT-III	INTRODUCTION TO DEEP LEARNING	Classes: 10

Introduction to Deep Learning, Historical Trends in Deep learning, Deep Feed - forward networks, Gradient-Based learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms

UNIT-IV	REGULARIZATION FOR DEEP LEARNING	Classes: 12

Regularization for Deep Learning: Parameter norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised learning, Multi-task learning, Early Stopping, Parameter Typing and Parameter Sharing, Sparse Representations, Bagging and other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, tangent Prop and Manifold, Tangent Classifier.

UNIT-V	OPTIMIZATION FOR TRAIN DEEP MODELS	Classes: 10

Optimization for Train Deep Models: Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second Order Methods, Optimization Strategies and Meta-Algorithms Applications: Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing.

TEXT BOOKS

1. Deep Learning: An MIT Press Book By Ian Good fellow and Yoshua Bengio and AaronCourville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.

REFERENCE BOOKS

1. Grokking Artificial Intelligence Algorithms by Rishal Hurbans published by Manning Publications
2. Deep Learning From Scratch: Building with Python from First Principles by Seth Weidman published by O`Reilley

WEB REFERENCES

1.https://project.inria.fr/deeplearning/files/2016/05/deepLearning.pdf
2.https://link.springer.com/book/10.1007/978-3-319-94463-0

E -TEXT BOOKS

1. https://books.google.co.in/books/about/Neural_Networks_and_Deep_Learning.html?id=achqDwAAQBAJ&redir_esc=y

MOOCS COURSES

1.https://margaretmz.medium.com/deep-learning-moocs-1be70cf9737f

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

INTRODUCTION TO EMBEDDED SYSTEMS (Professional Elective-IV)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS712PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To provide an overview of principles of Embedded System
2. To provide a clear understanding of role of firmware, operating systems in correlation with hardware systems.

COURSE OUTCOMES

1. Expected to understand the selection procedure of processors in the embedded domain.
2. Design procedure of embedded firm ware.
3. Expected to visualize the role of realtime operating systems in embedded systems.
4. Expected to evaluate the correlation between task synchronization and latency issues

UNIT-I	INTRODUCTION TO EMBEDDED SYSTEMS	Classes: 14

Introduction to Embedded Systems: Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major application areas, Purpose of E bedded Systems, Characteristics and Quality attributes of Embedded Systems.

UNIT-II	THE TYPICAL EMBEDDED SYSTEM	Classes: 13

The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System components.

UNIT-III	EMBEDDED FIRMWARE DESIGN AND DEVELOPMENT	Classes: 13

Embedded Firmware Design and Development: Embedded Firmware Design, Embedded Firmware Development Languages, Programming in Embedded C.

UNIT-IV	RTOS BASED EMBEDDED SYSTEM DESIGN	Classes: 14

RTOS Based Embedded System Design: Operating System basics, Types of Operating Systems, Tasks, Process, Threads, Multiprocessing and Multi-tasking, Task Scheduling, Threads-Processes Scheduling putting them together, Task Communication, Task Synchronization, Device Drivers, How to choose an RTOS

UNIT-V	INTEGRATION AND TESTING OF EMBEDDED HARDWARE AND FIRMWARE	Classes: 12

Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware and Firmware, Boards Bring up The Embedded System Development Environment: The Integrated Development Environment (IDE), Types of files generated on Cross-Compilation, Disassembler/Decompiler, Simulators, Emulators and Debugging, Target Hardware Debugging, Boundary Scan.

TEXT BOOKS

1.Shibu K V, "Introduction to Embedded Systems", Second Edition, Mc Graw Hill

REFERENCE BOOKS

1. Rajkamal, Embedded Systems Architecture, Programming and Design, Tata McGraw Hill
2. Frank Vahid and Tony Givargis, "Embedded Systems Design" - A Unified Hardware/Software Introduction, John Wiley
3. Lyla, "Embedded Systems" –Pearson
4. David E. Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.

WEB REFERENCES

1. https://www.omnisci.com/technical-glossary/embedded-systems
2. https://www.tutorialspoint.com/embedded_systems/es_overview.htm
3. https://internetofthingsagenda.techtarget.com/definition/embedded-system
4. https://www.javatpoint.com/embedded-system-tutorial

E -TEXT BOOKS

1. https://freecomputerbooks.com/Introduction-to-Embedded-Systems.html
2. https://ptolemy.berkeley.edu/books/leeseshia/releases/LeeSeshia_DigitalV2_2.pdf
3. https://www.iitg.ac.in/pbhaduri/cs52213/Introduction%20to%20Embedded%20Systems%20(ver%200.5,%20Aug%202010).pdf
4. https://www.electronicsforu.com/resources/eight-free-ebooks-embedded-systems
5. http://users.ece.utexas.edu/~valvano/Volume1/EBook/C1_EmbeddedSystemsShapeTheWorld.htm

MOOCS COURSES

1. https://www.mooc-list.com/tags/embedded-systems? cf_chl_rt_tk=2fg_Z3G3ALs.14v27V6OhhDpmsihvAfrtNaUrvAC..o-1639626729-0-gaNycGzNCZE

2. https://www.coursera.org/learn/introduction-embedded-systems
3. https://www.coursera.org/courses?query=embedded%20systems
4. https://www.edx.org/course/embedded-systems-shape-the-world-microcontroller-i

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ARTIFICIAL INTELLIGENCE (Professional Elective-IV)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS713PE	B. Tech	3	0	0	0	30	70	100

COURSE OBJECTIVES

To learn

1. The distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. Different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to formulate an efficient problem space for a problem expressed in natural language. Select a search algorithm for a problem and estimate its time and space complexities.
2. Possess the skill for representing knowledge using the appropriate technique for a given problem.
3. Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.

UNIT-I	INTRODUCTION OF AI	Classes: 12

Introduction: Importance of AI, Application areas of AI, Early work in AI, Goals of AI, Types of intelligence, Ai Approaches, Subsets of AI

UNIT-II	PROBLEM SOLVING BY SEARCH	Classes: 14

Problem Solving by Search Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environment .

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning, Imperfect Real-Time

Decisions.
Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

UNIT-III	Logics	Classes: 12

Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.
First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.
Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

UNIT-IV	Knowledge Representation and Planning	Classes: 12

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.
Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.
Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT-V	Uncertainty and Probabilistic Reasoning	Classes: 12

Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,
Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

TEXT BOOKS

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS

1. Artificial Intelligence, 3rd Edn, E. Rich and K.Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, ShivaniGoel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education

WEB REFERENCES

1. Charniak, E. (1985). Introduction to artificial intelligence. Pearson Education India.
1. Dick, S. (2019). Artificial intelligence.
2. Nilsson, N. J. (1982). Principles of artificial intelligence. Springer Science &

Business Media.

3. Nilsson, N. J. (2009). The quest for artificial intelligence. Cambridge University Press.
4. Barr, A., & Feigenbaum, E. A. (Eds.). (2014). The Handbook of Artificial Intelligence: Volume 2 (Vol. 2). Butterworth-Heinemann.

E -TEXT BOOKS

1. Jackson, P. C. (2019). Introduction to artificial intelligence. Courier Dover Publications.
2. Copeland, J. (1993). Artificial intelligence: A philosophical introduction. John Wiley & Sons.
3. Haugeland, J. (1989). Artificial intelligence: The very idea. MIT press.

MOOCS COURSES

1. https://www.mooc-list.com/tags/artificial-intelligence
2. https://www.edx.org/course/artificial-intelligence-ai
3. https://www.eumetsat.int/artificial-intelligence-earth-monitoring-mooc

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

CLOUD COMPUTING (Professional Elective-IV)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS714PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. This course provides an insight into cloud computing
2. Topics covered include-distributed system models, different cloud service models, service-oriented architectures, cloud programming and software environments, resource management.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to understand various service delivery models of a cloud computing architecture.
2. Ability to understand the ways in which the cloud can be programmed and deployed.
3. Understanding cloud service providers.

UNIT-I	SYSTEM MODELING	Classes: 12

Clustering and Virtualization: Distributed system models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtualization machines an Virtualization of clusters and Data centers.

UNIT-II	CLOUD COMPUTING FUNDAMENTALS	Classes: 12

Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models

UNIT-III	CLOUD COMPUTING ARCHITECTURE AND MANAGEMENT	Classes: 10

Cloud architecture, Layer, Anatomy of the Cloud, Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managing the Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT-IV	CLOUD SERVICE MODELS	Classes: 12
Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.		
UNIT-V	**CLOUD SERVICE PROVIDERS**	**Classes: 12**
EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft Assessment and Planning Toolkit, SharePoint, IBM, Cloud Models, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjrasoft, Aneka Platform		

TEXT BOOKS

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

WEB REFERENCES

1. https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/
2. https://www.zdnet.com/article/what-is-cloud-computing-everything-you- need-to-know-about-the-cloud/
3. https://www.salesforce.com/in/learning-centre/tech/cloudcomputing/

E -TEXT BOOKS

1. https://www.simplilearn.com/resources/cloud-computing/ebooks
2. http://www.freebookcentre.net/Networking/Cloud-Computing-Books.html
3. https://solutionsreview.com/cloud-platforms/free-cloud-computing-ebooks/

MOOCS COURSES

1. https://www.mooc-list.com/tags/cloud-computing
2. https://www.edureka.co/aws-certification-training?u
3. https://www.greatlearning.in/great-lakes-pgp-cloud-computing

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

AD-HOC & SENSOR NETWORKS (Professional Elective-IV)

IV B. TECH- I SEMESTER(R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS715PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To understand the concepts of sensor networks
2. To understand the MAC and transport protocols for adhoc networks
3. To understand the security of sensor networks
4. To understand the applications of adhoc and sensor networks.

COURSE OUTCOMES

1. Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks
2. Ability to solve the issues in real-time application development based on ASN.
3. Ability to conduct further research in the domain of ASN

UNIT-I	INTRODUCTION TO AD HOC NETWORKS	Classes: 14

Introduction to ADHOC Networks-Characteristics of MANETs, Applications of MANETs and Challenges of MANETs.

Routing in MANETs - Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms-**Proactive**: DSDV; **Reactive**: DSR, AODV; Hybrid: ZRP; Position-based routing algorithms – **Location Services** - DREAM, Quorum-based; **Forwarding Strategies:** Greedy Packet, Restricted Directional Flooding-DREAM, LAR.

UNIT-II	DATA TRANSMISSION	Classes: 12

DataTransmission-BroadcastStormProblem,**RebroadcastingSchemes**-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbor Knowledge-based: SBA, Multipoint Relaying, AHBP. **Multicasting: Tree-based:** AMRIS, MAODV; **Mesh-based:** ODMRP, CAMP; **Hybrid:** AM Route**,** MCEDAR

UNIT-III	GEOCASTING	Classes:10

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-Geo TORA,

MGR. TCP over ADHOC TCP protocol overview, TCP and MANETs, Solutions for TCP over ADHOC		
UNIT-IV	**BASICS OF WIRELESS NETWORKS**	**Classes: 12**
Basics of Wireless, Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.		
UNIT-V	**WSN**	**Classes: 12**
Upper Layer Issues of WSN: Transport layer, High level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile Robots.		

TEXT BOOKS

1. AdHoc and Sensor Networks Theory and Applications, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications, March 2006, ISBN–981–256–681–3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao,Leonidas Guibas, Elsevier Science, ISBN –978-1-55860-914-3 (Morgan Kauffman)

REFERENCE BOOKS

1.Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition) Paperback – Import, 1 March 2011 by Carlos De Morais Cordeiro, Dharma Prakash Agrawal.

2.Wireless Ad Hoc and Sensor Networks by Rohtash Ghuriya, GAZELLE BOOK SERVICES Rohtash Ghuriya

E -TEXT BOOKS

1. http://www.tfb.edu.mk › WSN › Kniga-w03 PDF
2. https://www.worldscientific.com/worldscibooks/10.1142/8066
3. Ad Hoc And Sensor Networks: Theory And Applications (2nd Edition) Paperback – Import, 1 March 2011 by Carlos De Morais Cordeiro, Dharma Prakash Agrawal

WEB REFERENCE

1. https://www.techslang.com/definition/what-is-an-ad-hoc-network/
2. https://www.techopedia.com/definition/5868/ad-hoc-network

MOOCS COURSES

1. https://nptel.ac.in/courses/106/105/106105160/
2. https://www.classcentral.com/course/swayam-wireless-ad-hoc-and-sensor-networks-7888
3. https://www.coursera.org/lecture/internet-of-things-history/sensor-networks-n-to-1-iOmzK

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ADVANCED ALGORITHMS (Professional Elective-V)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS721PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. Introduces the notations for analysis of the performance of algorithms.
2. Introduces the data structure disjoint sets.
3. Describes major algorithmic techniques (divide-and-conquer, backtracking, dynamic programming, greedy, branch and bound methods) and mention problems for which each technique is appropriate;
4. Describes how to evaluate and compare different algorithms using worst-, average-, and best- case analysis.
5. Explains the difference between tractable and intractable problems, and introduces the problems that are P, NP and NP complete.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to analyze the performance of algorithms.
2. Ability to choose appropriate data structures and algorithm design methods for aspecified application.
3. Ability to understand how the choice of data structures and the algorithm designmethods impact the performance of programs.

UNIT-I	NOTATION	Classes: 12

Introduction: Algorithm, Performance Analysis-Space complexity, Time complexity, Asymptotic Notations- Big oh notation, Omega notation, Theta notation and Little oh notation.

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT-II	DISJOINT SETS AND BACKTRACKING	Classes: 12

Disjoint Sets: Disjoint set operations, union and find algorithms

Backtracking: General method, applications, n-queen's problem, sum of subsets problem, graph coloring

UNIT-III	DYNAMIC PROGRAMMING	Classes: 10

Dynamic Programming: General method, applications- Optimal binary search trees, 0/1 knapsack problem, all pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT-IV	GREEDY METHOD	Classes: 10

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem

UNIT-V	BRANCH AND BOUND AND NP-HARD AND NP-COMPLETE PROBLEMS	Classes: 12

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem - LC Branch and Bound solution, FIFO Branch and Bound solution, FIFO Branch and Bound solution

NP-Hard and NP-Complete problems: Basic concepts, Deterministic Algorithm, non-deterministic algorithms, NP - Hard and NP-Complete classes, Cook's theorem

TEXT BOOKS

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharan, University Press.

REFERENCE BOOKS

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft, Pearson education.
2. Introduction to Algorithms, second edition, T. H. Cormen, C.E. Leiserson, R. L. Rivest, and C. Stein, PHI Pvt. Ltd./ Pearson Education.
3. Algorithm Design: Foundations, Analysis and Internet Examples, M.T. Goodrich and R. Tamassia, John Wiley and sons

WEB REFERENCES

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.cet.edu.in/noticefiles/278_DAA%20Complete.pdf

E -TEXT BOOKS

1.https://design-analysis-algorithms-2e-dave/dp/8131799433

2.https://www.e-booksdirectory.com/details.php?ebook=10830

MOOCS COURSES

1.https://swayam.gov.in/

2.https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

REAL TIME SYSTEMS (Professional Elective-V)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS722PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To provide broad understanding of the requirements of Real Time Operating Systems.
2. To make the student understand, applications of these Real Time features using case studies
3. Be able to implement a real-time system on an embedded processor.
4. Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OSII, TinyOs

COURSE OUTCOMES

1. Be able to explain real-time concepts such as pre-emptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores.
2. Able to describe how a real-time operating system kernel is implemented.
3. Able to explain how tasks are managed.
4. Explain how the real-time operating system implements time management.
5. Discuss how tasks can communicate using semaphores, mailboxes, and queues.

UNIT-I	The Introduction	Classes: 14

Introduction: Introduction to UNIX/LINUX, Overview of Commands, File I/O,(open, create, close,lseek,read,write),ProcessControl(fork,vfork,exit,wait,waitpid,exec).

UNIT-II	Real Time Operating Systems	Classes: 12

Real Time Operating Systems: Brief History of OS, Defining RTOS, The Scheduler, Object's, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content,Storage, Operations and Use.

UNIT-III	Objects, Services and I/O	Classes:10
Objects, Services and I/O: Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem.		
UNIT-IV	**Exceptions, Interrupts and Timers**	**Classes: 10**
Exceptions, Interrupts and Timers: Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines(ISR),Soft Timers, Operations.		
UNIT-V	**Case Studies of RTOS**	**Classes: 8**
CaseStudiesofRTOS:RTLinux,MicroC/OS-II,VxWorks,EmbeddedLinux,andTinyOS		

TEXT BOOKS

1. Real Time Concepts for Embedded Systems– QingLi,Elsevier,2011.

REFERENCE BOOKS

1. Embedded Systems-Architecture, Programming and Design by Rajkamal, 2007,TMH.
2. Advanced UNIX Programming, Richard Stevens 3.Embedded Linux: Hardware, Software and Interfacing–Dr.Craig Hollabaugh

WEB REFERENCE

1. https://users.ece.cmu.edu/~koopman/des_s99/real_time/
2. https://www.real-time-systems.com/

E -TEXT BOOKS

1. Real-Time Systems: Theory and Practice 1st Edition, Kindle Editionby Rajib Mall
2. Real-Time Systems Design and Analysis: Tools for the Practitioner, 4ed, Seppo J. Ovaska Phillip A. Laplante.
3. Real-Time Systems By Prof. Rajib Mall, Prof. Durga Prasad Mohapatra

MOOCS COURSES

1. https://www.coursera.org/learn/real-time-systems
2. https://nptel.ac.in/courses/106/105/106105036/
3. https://www.mooc-list.com/tags/real-time-systems

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SOFT COMPUTING (Professional Elective-V)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS723PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. Familiarize with soft computing concepts
2. Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
3. Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques
4. Learn the concepts of Genetic algorithm and its applications
5. Acquire the knowledge of Rough Sets

COURSE OUTCOMES

1. Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
2. Understand fuzzy logic and reasoning to handle and solve engineering problems
3. ApplytheClassificationandclusteringtechniquesonvariousapplications.
4. Understand the advanced neural networks and its applications
5. Perform various operations of genetic algorithms, Rough Sets.
6. Comprehend various techniques to build model for various applications

UNIT-I	Introduction to Soft Computing	Classes: 14

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II	Fuzzy Systems	Classes: 12

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III	Fuzzy Decision Making	Classes:10

Fuzzy Decision Making, Particle Swarm Optimization.

UNIT-IV	Genetic Algorithms	Classes: 12

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Cross over

and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.		
UNIT-V	**Rough Sets**	**Classes: 12**
Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.		

TEXT BOOKS

1. Soft Computing–Advancesand Applications-Jan 2015 by B.K.Tripathy and J.Anuradha–Cengage Learning

REFERENCE BOOKS

1. S.N.Sivanandam & S.N.Deepa,"PrinciplesofSoftComputing",2nd edition,Wiley India, 2008.
2. David E.Goldberg,"Genetic Algorithms In Search, optimization and Machine learning, Pearson Education.
3. J.S.R.Jang, C.T.Sunand E.Mizutani,"Neuro Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J.Klir & B.Yuan,"Fuzzy Sets & Fuzzy Logic",PHI,1995.
5. Melanie Mitchell,"An Introduction to Genetic Algorithm",PHI,1998.
6. Timothy J.Ross,"Fuzzy Logic with Engineering Applications", McGraw Hill International editions, 1995

E -TEXT BOOKS

1. https://books.google.com/books/about/Soft_Computing.html?id=IkajJC9iGxMC
2. https://www.myreaders.info/html/body_soft_computing.html

WEB REFERENCE

1. http://www.softcomputing.org/
2. http://www.softcomputing.net/

MOOCS COURSES

1. https://onlinecourses.nptel.ac.in/noc20_cs17/preview
2. https://onlinecourses.nptel.ac.in/noc21_cs11/preview

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

INTERNET OF THINGS (Professional Elective-V)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS724PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To introduce the terminology, technology and its applications
1. To introduce the concept of M2M (machine to machine) with necessary protocols
2. To introduce the Python Scripting Language which is used in many IoT devices
3. To introduce the Raspberry PI platform, that is widely used in IoT applications
4. To introduce the implementation of web based services on IoT devices

COURSE OUTCOMES

1. Interpret the impact and challenges posed by IoT networks leading to new architectural Models.
2. Compare and contrast the deployment of smart objects and the technologies to connect them to network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Elaborate the need for Data Analytics and Security in IoT.
5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

UNIT-I	Introduction to Internet of Things	Classes: 11

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT-II	IoT and M2M	Classes: 11

IoT and M2M – Software defined networks, network function virtualization, difference between SDN andNFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMPNETOPEER.

Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT-III	Introduction to Python	Classes: 11

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib.
Application protocols: MQTT, REST/HTTP, CoAP, MySQL, Back-end Application Designing Apache for handling HTTP Requests.

UNIT-IV	IoT Physical Devices and Endpoints	Classes: 11

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controllingoutput, reading input from pins.

UNIT-V	IoT Physical Servers and Cloud Offerings	Classes: 11

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing aRESTful web API

TEXT BOOKS

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
3.Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, November 2013, John Wiley and Sons.

REFERENCE BOOKS

1.Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013.
2. CunoPfister, Getting Started with the Internet of Things, O“Reilly Media, 2011, ISBN: 978-1-4493-9357-1

WEB REFERENCES

1.https://books.google.co.in/books/about/Internet_of_Things.html?id=JPKGBAAAQBAJ&printsec=frontcover&source=kp_read_button&redir_esc=y
2.http://202.62.95.70:8080/jspui/bitstream/123456789/12322/1/Internet%20of%20Things%20By%20Arshdeep%20Bahga.pdf

E -TEXT BOOKS

1. Internet of things security: principles and practices, quango Tang, fan du.

MOOCS COURSES

1. https://www.youtube.com/watch?v=LlhmzVL5bm8
2. https://www.youtube.com/watch?v=6mBO2vqLv38

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SOFTWARE PROCESS & PROJECT MANAGEMENT (Professional Elective-V)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS725PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To acquire knowledge on software process management
2. To acquire managerial skills for software project development
3. Tounderstandsoftware economics

COURSE OUTCOMES

1. Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation.
2. Analyze the major and minor milestones, artifacts and metrics from management and technical perspective.
3. Design and develop software product using conventional and modern principles of software project management.

UNIT-I	Software Process Maturity	Classes: 14

Software Process Maturity Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.
Process Reference Models Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT-II	Software Project Management Renaissance	Classes: 12

Software Project Management Renaissance Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.
Life-Cycle Phases and Process artifacts
Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures

UNIT-III	Workflows and Checkpoints	Classes:10

Workflows and Checkpoints of process Software process workflows, Iteration workflows, Major milestones

Minor milestones, periodic status assessments. Process Planning Work breakdownstructures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning

UNIT-IV	Project Organization	Classes: 12

Project Organizations Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation
The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT-V	CCPDS-R Case Study	Classes: 12

CCPDS-R case Study and Future Software Project Management Practices
Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions

TEXT BOOKS

1.Managing the Software Process, Watts S.Humphrey, Pearson Education 2.Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS

1. An Introduction to the Team Software Process, Watts S.Humphrey, Pearson Education, 2000.
2. Process Improvement essentials, James R. Persse,O'Reilly, 2006
3. Software Project Management, Bob Hughes& MikeCotterell,fourthedition,TMH,2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
5. HeadFirstPMP,JenniferGreene&AndrewStellman,O'Reilly,2007
6. Software Engineering Project Management, Richard Thayer & Edward Yourdon, 2nd edition, Wiley India, 2004.
7. Agile Project Management, Jim High smith, Pearson education, 2004

E -TEXT BOOKS

1.https://mrcet.com/downloads/digital_notes/CSE/IV%20Year/SOFTWARE%20PROCESS%20&%20PROJECT%20MANAGEMENT(R17A0539).pdf
2.https://www.routledge.com/Introduction-to-Software-Project-Management/Villafiorita/p/book/9781466559530
3.https://booksdelivery.com/software-process-and-project-management-by-valarmathi-me-books

WEB REFERENCE

1.https://orases.com/the-importance-of-project-management-for-software-development/
2.https://www.bmc.com/blogs/software-project-management/
3.http://www.qaielearning.com/training/project-management-basics

MOOCS COURSES

1.https://www.coursera.org/courses?query=software%20project%20management
2.https://www.learningtree.com/courses/340/software-development-project-management/
3.https://onlinecourses.nptel.ac.in/noc19_cs70/preview

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

COMPUTATIONAL COMPLEXITY (Professional Elective-VI)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS811PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. Introduces to theory of computational complexity classes.
2. Discuss about algorithmic techniques and application of these techniques to problems.
3. Introduce to randomized algorithms and discuss how effective they are in reducing time and space complexity.
4. Discuss about Graph based algorithms and approximation algorithms.
5. Discuss about search trees.

COURSE OUTCOMES

1. Ability to classify decision problems into appropriate complexity classes
2. Ability to specify what it means to reduce one problem to another, and construct reductions for simple examples.
3. Ability to classify optimization problems into appropriate approximation complexity classes
4. Ability to choose appropriate data structure for the given problem
5. Ability to choose and apply appropriate design method for the given problem

UNIT-I	COMPUTATIONALCOMPLEXITY	Classes: 18

Complexity Theory: Introduction, What is a Problem, What is Computation, Computing a Function, Examples of Turing Machines, Robustness of Turing Machines, The Halting Problem, Rice Theorem, Using Rice Theorem, Polynomial time and its justification, Nontrivial examples of polynomial-time algorithms, the concept of reduction (reducibility), Class P Class NP and NP- Completeness, The Pversus NP problem and why it's hard

UNIT-II	ALGORITHMIC PARADIGIMS	Classes: 14

Dynamic Programming – Longest common sub sequence, matrix chain multiplication, knapsack problem, Greedy – 0-1 knapsack, fractional knapsack, scheduling problem, Huffman coding, MST, Branch-and-bound – travelling sales person problem, 0/1 knapsack

problem, Divide and Conquer – Merge sort, binary search, quick sort, Proving theorems and Halting problem, The Gödel's incompleteness theorem, The complexity of Class P.		
UNIT-III	**RANDOMIZED ALGORITHMS**	**Classes: 13**
Finger Printing, Pattern Matching, Graph Problems, Algebraic Methods, Probabilistic Primality Testing, De-Randomization Advanced Algorithms.		
UNIT-IV	**GRAPH ALGORITHMS**	**Classes: 11**
Shortest paths, Flow networks, Spanning Trees; Approximation algorithms, Randomized algorithms. Approximation algorithms: Polynomial Time Approximation Schemes, The Knapsack Problem, A Dynamic Program for the Knapsack Problem, An FPTAS for the Knapsack Problem.		
UNIT-V	**ADVANCED DATA STRUCTURES AND APPLICATIONS**	**Classes: 11**
Decision Trees and Circuits, B-Trees, AVL Trees, Red and Black trees, Dictionaries and tries, Maps, Binomial Heaps, Fibonacci Heaps, Disjoint sets, Union by Rank and Path Compression.		

TEXT BOOKS

1. T. Cormen, C. Leiserson, R. Rivest and C. Stein, Introduction to Algorithms, Third Edition, McGraw-Hill, 2009.
2. R. Motwani and P. Raghavan, Randomized Algorithms, Cambridge University Press, 1995.
3. J. J. McConnell, Analysis of Algorithms: An Active Learning Approach, Jones & Bartlett Publishers, 2001.
4. D. E. Knuth, Art of Computer Programming, Volume 3, Sorting and Searching, Second Edition, Addison-Wesley Professional, 1998.
5. S. Dasgupta, C. H. Papadimitriou and U. V. Vazirani, Algorithms, McGraw-Hill, 2008.

REFERENCE BOOKS

1. Computational Complexity: A Modern Approach by S. Arora and B. Barak.
2. Algorithm Design by J. Kleinberg and E. Tardos.

WEB REFERENCES

1. https://plato.stanford.edu/entries/computational-complexity/

E -TEXT BOOKS

1. https://books.google.co.in/books?id=tZYdEAAAQBAJ
2. https://books.askvenkat.org/cc-books/
3. https://www.kopykitab.com/cc-Notes-eBook
4. https://www.cl.cam.ac.uk/teaching/0809/aos/cc.pdf

MOOCS COURSES
1. https://web.iitd.ac.in/~rbose/initiative/MOOCS.pdf 2. http://etsc.iitd.ac.in/pdf_files/MOOCs%20IIT%20ETSC.pdf

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DISTRIBUTED SYSTEMS (Professional Elective-VI)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS812PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. This course provides an insight into Distributed systems.
2. Topics include- Peer to Peer Systems, Transactions and Concurrency control, Security and Distributed shared memory

COURSE OUTCOMES

1. Ability to understand Transactions and Concurrency control.
2. Ability to understand Security issues.
3. Understanding Distributed shared memory.
4. Ability to design distributed systems for basic level applications.

UNIT-I	CHARACTERIZATION OF DISTRIBUTED SYSTEMS	Classes: 18

Characterization of Distributed Systems-Introduction, Examples of Distributed systems, Resource sharing and web, challenges, System models -Introduction, Architectural and Fundamental models, Networking and Internetworking, Interprocess Communication, Distributed objects and Remote Invocation-Introduction, Communication between distributed objects, RPC, Events and notifications, Case study-Java RMI.

UNIT-II	OPERATING SYSTEM SUPPORT	Classes: 14

Operating System Support- Introduction, OS layer, Protection, Processes and Threads, Communication and Invocation, Operating system architecture, Distributed File Systems-Introduction, File Service architecture.

UNIT-III	PEER TO PEER SYSTEMS	Classes: 13

Peer to Peer Systems–Introduction, Napster and its legacy, Peer to Peer middleware, Routing overlays, Overlay case studies-Pastry, Tapestry, Application case studies-Squirrel, Ocean Store. Time and Global States-Introduction, Clocks, events and Process states, Synchronizing physical clocks, logical time and logical clocks, global states, distributed debugging. Coordination and Agreement-Introduction, Distributed mutual exclusion, Elections, Multicast communication, consensus and related problems.

UNIT-IV	TRANSACTIONS AND CONCURRENCY CONTROL	Classes: 11
Transactions and Concurrency Control-Introduction, Transactions, Nested Transactions, Locks, Optimistic concurrency control, Timestamp ordering. Distributed Transactions-Introduction, Flat and Nested Distributed Transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery.		
UNIT-V	**REPLICATION**	**Classes: 11**
Replication-Introduction, System model and group communication, Fault tolerant services, Transactions with replicated data. Distributed shared memory, Design and Implementation issues, Consistency models		

TEXT BOOKS

1. Distributed Systems Concepts and Design, G Coulouris, J Dollimore and T Kindberg, Fourth Edition, Pearson Education.
2. Distributed Systems, S.Ghosh, Chapman & Hall/CRC, Taylor & Francis Group, 2010.

REFERENCE BOOKS

1. Distributed Systems – Principles and Paradigms, A.S. Tanenbaum and M.V. Steen, Pearson Education.
2. Distributed Computing, Principles, Algorithms and Systems, Ajay D. Kshemakalyani and Mukesh Singhal, Cambridge, rp 2010.

WEB REFERENCES

1. https://plato.stanford.edu/entries/computational-complexity/

E -TEXT BOOKS

1. https://books.google.co.in/books?id=tZYdEAAAQBAJ
2. https://books.askvenkat.org/cc-books/
3. https://www.kopykitab.com/cc-Notes-eBook
4. https://www.cl.cam.ac.uk/teaching/0809/aos/cc.pdf

MOOCS COURSES

1. https://web.iitd.ac.in/~rbose/initiative/MOOCS.pdf
2. http://etsc.iitd.ac.in/pdf_files/MOOCs%20IIT%20ETSC.pdf

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

GRAPH THEORY (Professional Elective-VI)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS813PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To Learn

1. classes of graph theoretic problems;
2. central theorems about trees, matching, connectivity, colouring and planar graphs;
3. Be able to describe and apply some basic algorithms for graphs;
4. Be able to use graph theory as a modelling tool

COURSE OUTCOMES

1. Know some important classes of graph theoretic problems;
2. Be able to formulate and prove central theorems about trees, matching, connectivity, colouring and planar graphs;
3. Be able to describe and apply some basic algorithms for graphs;
4. Be able to use graph theory as a modelling tool.

UNIT-I	INTRODUCTION GRAPH	Classes: 11

Introduction-Discovery of graphs, Definitions, Subgraphs, Isomorphic graphs, Matrix representations of graphs, Degree of a vertex, Directed walks, paths and cycles, Connectivity in digraphs, Eulerian and Hamilton digraphs, Eulerian digraphs, Hamilton digraphs, Special graphs, Complements, Larger graphs from smaller graphs, Union, Sum, Cartesian Product, Composition, Graphic sequences, Graph theoretic model of the LAN problem, Havel-Hakimi criterion, Realization of a graphic sequence

UNIT-II	CONNECTED GRAPHS AND SHORTEST PATHS	Classes: 11

Connected graphs and shortest paths - Walks, trails, paths, cycles, Connected graphs, Distance, Cut-vertices and cut-edges, Blocks, Connectivity, Weighted graphs and shortest paths, Weighted graphs, Dijkstra‟s shortest path algorithm, Floyd-Warshall shortest path algorithm.

UNIT-III	TREES	Classes: 11

Trees- Definitions and characterizations, Number of trees, Cayley‟s formula, Kircho↵-matrix-tree theorem, Minimum spanning trees, Kruskal‟s algorithm, Prim‟s algorithm, Special classes of graphs, Bipartite Graphs, Line Graphs, Chordal Graphs, Eulerian Graphs, Fleury‟s algorithm, Chinese Postman problem,

Hamilton Graphs, Introduction, Necessary conditions and sufficient conditions.

UNIT-IV	INDEPENDENT SETS COVERINGS AND MATCHINGS	Classes: 11

Independent sets coverings and matchings– Introduction, Independent sets and coverings: basic equations, Matchings in bipartite graphs, Hall‟s Theorem, K¨onig‟s Theorem, Perfect matchings in graphs, Greedy and approximation algorithms.

UNIT-V	VERTEX COLORINGS	Classes: 11

Vertex Colorings- Basic definitions, Cliques and chromatic number, Mycielski‟s theorem, Greedy coloring algorithm, Coloring of chordal graphs, Brooks theorem, Edge Colorings, Introduction and Basics, Gupta-Vizing theorem, Class-1 and Class-2 graphs, Edge-coloring of bipartite graphs, Class-2 graphs, Hajos union and Class-2 graphs, A scheduling problem and equitable edge-coloring.

TEXT BOOKS

1. J. A. Bondy and U. S. R. Murty. Graph Theory, volume 244 of Graduate Texts in Mathematics. Springer, 1st edition, 2008.
2. J. A. Bondy and U. S. R. Murty. Graph Theory with Applications.

REFERENCE BOOKS

1. Lecture Videos: http://nptel.ac.in/courses/111106050/13
2. Introduction to Graph Theory, Douglas B. West, Pearson.
3. Schaum's Outlines Graph Theory, Balakrishnan, TMH
4. Introduction to Graph Theory, Wilson Robin j, PHI
5. Graph Theory with Applications to Engineering And Computer Science, Narsing Deo, PHI
6. Graphs - An Introductory Approach, Wilson and Watkins

WEB REFERENCES

1. https://www.geeksforgeeks.org/mathematics-graph-theory-basics-set-1/
2. https://medium.com/basecs/a-gentle-introduction-to-graph-theory-77969829ead8
3. https://www.britannica.com/topic/graph-theory
4. https://towardsdatascience.com/what-is-graph-theory-and-why-should-you-care-28d6a715a5c2

E -TEXT BOOKS

1. http://www.freebookcentre.net/Mathematics/Graph-Theory-Books.html
2. https://www.kobo.com/us/en/ebook/a-textbook-of-graph-theory
3. https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf
4. https://www.e-booksdirectory.com/listing.php?category=53

MOOCS COURSES

1. https://www.coursera.org/courses?query=graph%20theory
2. https://www.mooc-list.com/tags/graph-theory
3. https://www.classcentral.com/tag/graph-theory
4. https://www.edx.org/course/advanced-algorithmics-and-graph-theory-with-python
5. https://nptel.ac.in/courses/111/106/111106050/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

HUMAN COMPUTER INTERACTION (Professional Elective-VI)

IV B. TECH- IISEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS814PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design in general, and alternatives to traditional "keyboard and mouse" computing;
2. Become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans; be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks
3. Recognize the limits of human performance as they apply to computer operation; appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user;
4. Be familiar with a variety of both conventional and non-traditional user interface paradigms, the latter including virtual and augmented reality, mobile and wearable computing, and ubiquitous computing;
5. Understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems. Finally, working in small groups on a product design from start to finish will provide you with invaluable team-work experience.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Ability to apply HCI and principles to interaction design.
2. Ability to design certain tools for blind or PH people.

UNIT-I	INTRODUCTION	Classes: 12

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT-II	DESIGN PROCESS	Classes: 10

Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions. Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing

composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT-III	WINDOWS	Classes: 10

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT-IV	HCI IN THE SOFTWARE PROCESS	Classes: 12

HCI in the software process, The software life cycle Usability engineering Iterative design and prototyping Design Focus: Prototyping in practice Design rationale Design rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

UNIT-V	COGNITIVE MODELS GOAL AND TASK HIERARCHIES DESIGN FOCUS	Classes: 12

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money Linguistic models The challenge of display-based systems Physical and device models Cognitive architectures Ubiquitous computing and augmented realities Ubiquitous computing applications research Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of Augmented reality Information and data visualization Design Focus: Getting the size right.

TEXT BOOKS

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2, 3
2. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education Units 4,5

REFERENCE BOOKS

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia. 2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
2. User Interface Design, Soren Lauesen , Pearson Education.
3. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
4. Human –Computer Interaction, Smith - Atakan, Cengage Learning

WEB REFERENCES

1.https://onlinelibrary.wiley.com/doi/full/10.1002/9781118540190.wbeic182

E -TEXT BOOKS

1. https://www.ncertbooks.guru/human-computer-interaction-pdf/
2. https://www.amazon.in/Human-Computer-Interaction-3e-Dix/dp/8131717038

MOOCS COURSES

1. https://www.mooc-list.com/tags/human-computer-interaction

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

CYBER FORENSICS (Professional Elective-VI)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS815PE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

To learn

1. A brief explanation of the objective is to provide digital evidences which are obtainedfrom digital media.
2. In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
3. According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

COURSE OUTCOMES

Upon successful completion of the course, the student is able to

1. Students will understand the usage of computers in forensic and grow to use various Forensic tools for wide variety of investigations.
2. It gives an opportunity to students to continue their zeal in research in computer Forensics.
3. Techniques and tools will be used for data recovery.
4. Improve knowledge in various Disk and File systems.
5. Students can gain knowledge in Data validation, verification, Authentication and Authorization etc.

UNIT-I	INTRODUCTION OF CYBERCRIME	Classes: 10

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident – Incident Response Methodology –Steps - Activities in Initial Response, Phase after detection of an incident.

UNIT-II	INTRODUCTION T0 FORENSIC DUPLICATION	Classes: 10

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

UNIT-III	COMPUTER FORENSIC ANALYSIS AND VALIDATION	Classes: 12
Computer forensic analysis and validation: Determining what data to collect and analyse, validating forensic data, addressing data-hiding techniques, and performing remote acquisitions Network Forensics: Network forensic overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honey net project.		
UNIT-IV	**CURRENT COMPUTER FORENSIC TOOLS**	**Classes: 10**
Current Computer Forensic Tools: evaluating computer forensic tool needs, computer forensic software tools, computer forensic hardware tools, validating and testing forensic software. E-mail investigations: Exploring the role of email in investigations, exploring the role of client and server in email, investigating email crimes and violations, understanding email servers, using specialized email forensic tools. Cell phone and mobile device forensics Understanding mobile device forensic, understanding acquisition procedures for cell phones and mobile devices.		
UNIT-V	**WORKING WITH WINDOWS AND DOS SYSTEMS**	**Classes: 10**
Working with windows and dos systems: understanding file systems, exploring Microsoft file structures examining NTFS disks, understanding whole disk encryption, registry, Microsoft startup tasks, MS Dos startup tasks, virtual machines		

TEXT BOOKS

1. Computer Forensics, Computer Crime Investigation by John R,Vacca, Firewall Media, New Delhi.
2. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS

1. Real Digital Forensics by Keith j. Jones, Richard Bejitlich, Curtis W.Rose ,Addison-Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brain Jenkinson, Springer International edition
3. Computer Evidence Collection & Presentation by Chrostopher L.T. Brown, Firewall Media
4. Homeland Security, Techniques & Technologies by Jesus Mena, Firewall Media. Software Forensics Collecting Evidence from the Sceneofa Digital Crime by Robert M.Slade, TMH, 2005
5. Windows Forensics by Chad Steel, Wiley India Edition

WEB REFERENCES

1. https://en.wikipedia.org/wiki/Computer_forensics

E -TEXT BOOKS

1. https://mrcet.com/pdf/Lab%20Manuals/IT/R15A0533%20CF.pdf

MOOCS COURSES

1. https://www.my-mooc.com/en/mooc/computer-forensics-ritx-cyber502x/.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

S. No	Branch	III Year II Sem. Open Elective (OE – I)		IV Year I Sem. Open Elective (OE – II)		IV Year II Sem. Open Elective (OE – III)	
		Subject Code	Subject Name	Subject Code	Subject Name	Subject Code	Subject Name
1.	Computer Science and Engineering / Information Technology / Computer Science and Engineering (AI & ML)	CE600OE	Entrepreneurship	CE700OE	Data Structures	CE800OE	Machine Learning
		CE601OE	Fundamentals of Management for Engineers	CE701OE	Artificial Intelligence	CE801OE	Mobile Application Development
		CE602OE	Cyber Law & Ethics	CE702OE	Python Programming	CE802OE	Scripting Languages
				CE703OE	Java Programming	CE803OE	Database Management Systems

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ENTREPRENEURSHIP (Open Elective-I)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS600OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

The aim of this course is to have a comprehensive perspective of inclusive learning, ability to learn and implement the Fundamentals of Entrepreneurship.

COURSE OUTCOMES

It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.

UNIT-I	**ENTREPRENEURIAL PERSPECTIVES**	**Classes: 12**

Introduction to Entrepreneurship – Evolution - Concept of Entrepreneurship - Types of Entrepreneurs -Entrepreneurial Competencies, Capacity Building for Entrepreneurs. Entrepreneurial Training Methods - Entrepreneurial Motivations - Models for Entrepreneurial Development - The process of Entrepreneurial Development.

UNIT-II	**NEW VENTURE CREATION**	**Classes: 12**

Introduction, Mobility of Entrepreneurs, Models for Opportunity Evaluation; Business plans – Purpose, Contents, Presenting Business Plan, Procedure for setting up Enterprises, Central level - Startup and State level - T Hub, Other Institutions initiatives.

UNIT-III	**MANAGEMENT OF MSMES AND SICK ENTERPRISES**	**Classes: 12**

Challenges of MSMEs, Preventing Sickness in Enterprises – Specific Management Problems; Industrial Sickness; Industrial Sickness in India – Symptoms, process and Rehabilitation of Sick Units.

UNIT-IV	**MANAGING MARKETING AND GROWTH OF ENTERPRISES**	**Classes: 12**

Essential Marketing Mix of Services, Key Success Factors in Service Marketing, Cost and Pricing, Branding, New Techniques in Marketing, International Trade.

UNIT-V	**STRATEGIC PERSPECTIVES IN ENTREPRENEURSHIP**	**Classes: 12**

Strategic Growth in Entrepreneurship, The Valuation Challenge in Entrepreneurship, The

Final Harvest of New Ventures, Technology, Business Incubation, India way – Entrepreneurship; Women Entrepreneurs – Strategies to develop Women Entrepreneurs, Institutions supporting Women Entrepreneurship in India.

TEXT BOOKS

1. Entrepreneurship Development and Small Business Enterprises, Poornima M. Charantimath, 2e, Pearson, 2014.
2. Entrepreneurship, a South – Asian Perspective, D.F. Kuratko and T. V. Rao, 3e, Cengage, 2012.
3. Entrepreneurship, Arya Kumar, 4 e, Pearson 2015.

REFERENCE BOOKS

1. The Dynamics of Entrepreneurial Development and Management, Vasant Desai, Himalaya Publishing House, 2015.

WEB REFERENCES

1. https://guides.loc.gov/entrepreneurs-reference-guide
2. https://journals.sagepub.com/home/etp
3. https://en.wikipedia.org/wiki/Entrepreneurship

E -TEXT BOOKS

1. https://www.inc.com/rhett-power/15-free-ebooks-that-will-help-you-grow-as-an-entrepreneur.html
2. https://www.freebookcentre.net/business-books-download/Entrepreneurship-and-Creativity.html
3. https://www.freebookcentre.net/business-books-download/Entrepreneurship-and-Small-Scale-Businesses.html
4. https://www.freebookcentre.net/business-books-download/A-Course-Material-On-Enterpreneurship-Development.html

MOOCS COURSES

1. https://www.my-mooc.com/en/mooc/entrepreneurship-capstone/
2. https://www.mooc-list.com/tags/entrepreneurship
3. https://mooc-book.eu/index/learn-more/key-areas/13-entrepreneurship-moocs/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

FUNDAMENTALS OF MANAGEMENT FOR ENGINEERS (Open Elective-I)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS601OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To understand the Management Concepts, applications of Concepts in Practical aspects of business and development of Managerial Skills for Engineers.

COURSE OUTCOMES

1. The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

UNIT-I	INTRODUCTION TO MANAGEMENT	Classes: 12

Evolution of Management, Nature & Scope-Functions of Management- Role of Manager-levels of Management-Managerial Skills - Challenges-Planning-Planning Process- Types of Plans-MBO

UNIT-II	ORGANIZATION STRUCTURE & HRM	Classes: 12

Organization Design-Organizational Structure- Departmentation– Delegation-Centralization – Decentralization-Recentralization-Organizational Culture-Organizational climate- Organizational change Human Resource Management-HR Planning - Recruitment & Selection - Training & Development- Performance appraisal - Job Satisfaction-Stress Management Practices

UNIT-III	OPERATION MANAGEMENT	Classes: 12

Introduction to Operations Management-Principles and Types of Plant Layout-Methods of production (Job Batch and Mass production) - Method study and Work Measurement-Quality Management - TQM-Six sigma - Deming's Contribution to Quality – Inventory Management – EOQ - ABC Analysis - JIT System-Business Process Re-engineering (BPR)

UNIT-IV	MARKETING MANAGEMENT	Classes: 12

Introduction to Marketing-Functions of Marketing-Marketing vs. Selling- Marketing Mix - Marketing Strategies - Product Life Cycle - Market Segmentation -Types of

Marketing - Direct Marketing-Network Marketing - Digital Marketing-Channels of Distribution - Supply Chain Management (SCM)		
UNIT-V	**PROJECT MANAGEMENT**	**Classes: 12**
Introduction to Project Management-steps in Project Management – Project Planning - Project Life Cycle-Network Analysis-Program Evaluation & Review Technique (PERT)-Critical Path Method (CPM) - Project Cost Analysis - Project Crashing - Project Information Systems		

TEXT BOOKS

1. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
2. Fundamentals of Management, Stephen P.Robbins, Pearson Education, 2009.
3. Essentials of Management, Koontz Kleihrich, Tata Mc - Graw Hill.
4. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.

REFERENCE BOOKS

1. Industrial Engineering and Management: Including Production Management, T.R.Banga, S.C Sharma , Khanna Publishers.

WEB REFERENCES

1. https://lecturenotes.in/subject/836/fundamentals-of-management
2. https://pdfcoffee.com/fundamentals-of-management-notes-jntuh-pdf-free.html

E -TEXT BOOKS

1. https://easyengineering.net/principles-of-management-by-sundar-nw/
2. https://www.ululu.in/b-tech-fundamentals-management-handwritten-class-notes/

MOOCS COURSES

1. https://www.coursera.org/courses?query=engineering%20management
2. https://www.mooc-list.com/tags/engineering-management
3. https://www.classcentral.com/course/funmanage-2720

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

INTRODUCTION TO CYBER LAWS AND ETHICS (Open Elective-I)

III B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS602OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession.

COURSE OUTCOMES

1. The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
2. The students will learn the rights and responsibilities as an employee, team member and a global citizen.

UNIT-I	**INTRODUCTION TO COMPUTER SECURITY**	**Classes: 12**

Definition, Threats to security, Government requirements, Information Protection and Access Controls, Computer security efforts, Standards, Computer Security mandates and legislation, Privacy considerations, International security activity.

UNIT-II	**SECURE SYSTEM PLANNING AND ADMINISTRATION**	**Classes: 12**

Introduction to the orange book, Security policy requirements, accountability, assurance and documentation requirements, Network Security, The Red book and Government network evaluations.

UNIT-III	**INFORMATION SECURITY POLICIES AND PROCEDURES**	**Classes: 12**

Corporate policies- Tier 1, Tier 2 and Tier3 policies - process management-planning and preparation-developing policies-asset classification policy developing standards.

UNIT-IV	**INFORMATION SECURITY**	**Classes: 12**

Fundamentals-Employee responsibilities- information classification- Information handling-Tools of information security- Information processing-secure program administration.

UNIT-V	**ORGANIZATIONAL AND HUMAN SECURITY**	**Classes: 12**

Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

TEXT BOOKS

1. Debby Russell and Sr. G. T Gangemi, "Computer Security Basics (Paperback)", 2nd Edition, O'Reilly Media, 2006.
2. Thomas R. Peltier, "Information Security policies and procedures: A Practitioner's Reference", 2nd Edition Prentice Hall, 2004.
3. Kenneth J. Knapp, "Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions", IGI Global, 2009.
4. Thomas R Peltier, Justin Peltier and John blackley," Information Security Fundamentals", 2nd Edition, Prentice Hall, 1996
5. Jonathan Rosenoer, "Cyber law: the Law of the Internet", Springer-verlag, 1997

REFERENCE BOOKS

1. James Graham, "Cyber Security Essentials" Averbach Publication T & F Group.

WEB REFERENCES

1. http://kanoon.nearlaw.com/2017/10/26/cyber-law-and-ethics/#:~:text=Cyber%20law%20is%20also%20known,and%20information%20systems%20(IS).
2. https://blog.ipleaders.in/cyber-law-ethics-india/
3. https://www.routledge.com/Cyber-Law-and-Ethics-Regulation-of-the-Connected-World/Grabowski-Robinson/p/book/9780367462604

E -TEXT BOOKS

1. https://www.scu.edu/media/ethics-center/technology-ethics/IntroToCybersecurityEthics.pdf
2. https://www.researchgate.net/publication/215705616_Investigating_Cyber_Law_and_Cyber_Ethics_Issues_Impacts_and_Practices
3. https://www.perlego.com/book/2554909/cyber-law-and-ethics-regulation-of-the-connected-world-pdf

MOOCS COURSES

1. http://www.wbnsou.ac.in/NSOU-MOOC/mooc_cyber_security.shtml

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATA STRUCTURES (Open Elective-II)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS700OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. Exploring basic data structures such as stacks and queues.
2. Introduces a variety of data structures such as hash tables, search trees, tries, heaps, graphs.
3. Introduces sorting and pattern matching algorithms.

COURSE OUTCOMES

1. Ability to select the data structures that efficiently model the information in a problem.
2. Ability to assess efficiency trade-offs among different data structure implementations or combinations.
3. Implement and know the application of algorithms for sorting and pattern matching.
4. Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.

UNIT-I	INTRODUCTION TO DATA STRUCTURES	Classes: 12

Abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

UNIT-II	DICTIONARIES & HASH TABLE REPRESENTATION	Classes: 12

Linear list representation, skip list representation, operations - insertion, deletion and searching.

Hash functions, collision resolution-separate chaining, open addressing linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT-III	SEARCH TREES	Classes: 12

Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion

and Searching, Red –Black, Splay Trees.		
UNIT-IV	**GRAPHS & SORTINGS**	**Classes: 12**
Graph Implementation Methods. Graph Traversal Methods. Heap Sort, External Sorting- Model for external sorting, Merge Sort.		
UNIT-V	**PATTERN MATCHING AND TRIES**	**Classes: 12**
Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries.		

TEXT BOOKS

1. Fundamentals of data structures in C, 2 nd edition, E.Horowitz, S.Sahni and Susan Anderson Freed, Universities Press.
2. Data structures using c – A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/pearson education.

REFERENCE BOOKS

1. Data structures: A Pseudocode Approach with C, 2nd edition, R.F.Gilberg And B.A.Forouzan, Cengage Learning.
2. Introduction to data structures in c, 1/e Ashok Kamthane.

WEB REFERENCES

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.javatpoint.com/data-structure-tutorial
3. https://www.programiz.com/dsa

E -TEXT BOOKS

1. http://freebooks.pupilgarage.com/FreeBookDownload?category=algorithm_datastructures
2. https://www.cs.bham.ac.uk/~jxb/DSA/dsa.pdf
3. https://www.ncertbooks.guru/data-structures/
4. https://www.freebookcentre.net/ComputerScience-Books-Download/Data-Structures-and-Algorithms.html
5. https://www.cet.edu.in/noticefiles/280_DS%20Complete.pdf

MOOCS COURSES

1. https://www.mooc-list.com/tags/data-structures
2. https://www.coursera.org/specializations/data-structures-algorithms
3. https://www.my-mooc.com/en/categorie/algorithms-and-data-structures

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

ARTIFICIAL INTELLIGENCE (Open Elective-II)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS701OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To learn the distinction between optimal reasoning Vs. human like reasoning
2. To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
3. To learn different knowledge representation techniques.
4. To understand the applications of AI, namely game playing, theorem proving, and machine learning.

COURSE OUTCOMES

1. Ability to formulate an efficient problem space for a problem expressed in natural language.
2. Select a search algorithm for a problem and estimate its time and space complexities.
3. Possess the skill for representing knowledge using the appropriate technique for a given problem.
4. Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.

UNIT-I	PROBLEM SOLVING BY SEARCH	Classes: 12

Problem Solving by Search-I: Introduction to AI, Intelligent Agents

Problem Solving by Search –II: Problem-Solving Agents, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Uniform cost search, Depth-first search, Iterative deepening Depth-first search, Bidirectional search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Heuristic Functions, Beyond Classical Search: Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces, Searching with Non-Deterministic Actions, Searching wih Partial Observations, Online Search Agents and Unknown Environment.

UNIT-II	PROBLEM SOLVING BY SEARCH-II AND PROPOSITIONAL LOGIC	Classes: 12

Adversarial Search: Games, Optimal Decisions in Games, Alpha–Beta Pruning,

Imperfect Real-Time Decisions.

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Propositional Logic: Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses, Forward and backward chaining, Effective Propositional Model Checking, Agents Based on Propositional Logic.

UNIT-III	LOGIC AND KNOWLEDGE REPRESENTATION	Classes: 12

First-Order Logic: Representation, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining, Backward Chaining, Resolution.

Knowledge Representation: Ontological Engineering, Categories and Objects, Events. Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information.

UNIT-IV	PLANNING	Classes: 12

Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches.

Planning and Acting in the Real World: Time, Schedules, and Resources, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Multi agent Planning.

UNIT-V	UNCERTAIN KNOWLEDGE AND LEARNING	Classes: 12

Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use,

Probabilistic Reasoning: Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First-Order Probability, Other Approaches to Uncertain Reasoning; Dempster-Shafer theory.

Learning: Forms of Learning, Supervised Learning, Learning Decision Trees. Knowledge in Learning: Logical Formulation of Learning, Knowledge in Learning, Explanation-Based Learning, Learning Using Relevance Information, Inductive Logic Programming.

TEXT BOOKS

1. Artificial Intelligence A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

REFERENCE BOOKS

1. Artificial Intelligence, 3rd Edn, E.Rich and K.Knight (TMH).
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.

3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

WEB REFERENCES

1. https://www.britannica.com/technology/artificial-intelligence
2. https://builtin.com/artificial-intelligence
3. https://www.techtarget.com/searchenterpriseai/definition/AI-Artificial-Intelligence
4. https://www.ibm.com/in-en/cloud/learn/what-is-artificial-intelligence

E -TEXT BOOKS

1. https://www.amazon.in/Artificial-Intelligence-Books/b?ie=UTF8&node=4149453031
2. https://www.mygreatlearning.com/blog/artificial-intelligence-books/
3. https://www.analyticsinsight.net/top-12-books-on-artificial-intelligence/
4. https://towardsdatascience.com/5-books-you-can-read-to-learn-about-artificial-intelligence-477b5a26277d

MOOCS COURSES

1. https://www.mooc-list.com/tags/artificial-intelligence
2. https://www.coursera.org/courses?query=artificial%20intelligence

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

PYTHON PROGRAMMING (Open Elective-II)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS702OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

This course will enable students to

1. Learn Syntax and Semantics and create Functions in Python.
2. Handle Strings and Files in Python.
3. Understand Lists, Dictionaries and Regular expressions in Python.
4. Implement Object Oriented Programming concepts in Python.
5. Build Web Services and introduction to Network and Database Programming in Python.

COURSE OUTCOMES

The students should be able to:

1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
2. Demonstrate proficiency in handling Strings and File Systems.
3. Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
4. Interpret the concepts of Object-Oriented Programming as used in Python.
5. Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

UNIT-I	PYTHON BASICS	Classes: 12

Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules

Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT-II	FILES	Classes: 12

File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Files, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management,

*Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, *Creating Exceptions, Why Exceptions (Now)?, Why Exceptions at All?, Exceptions and the sys

Module, Related Modules Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT-III	REGULAR EXPRESSIONS	Classes: 12

Introduction, Special Symbols and Characters, Res and Python Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

UNIT-IV	GUI PROGRAMMING	Classes: 12

Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

UNIT-V	DATABASE PROGRAMMING	Classes: 12

Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules

TEXT BOOKS

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.

REFERENCE BOOKS

1. https://www.python.org/

WEB REFERENCES

1. https://swayam.gov.in/nd1_noc19_cs41/preview
2. https://swayam.gov.in/nd1_noc19_mg47/preview
3. https://swayam.gov.in/nd1_noc19_cs40/preview

E -TEXT BOOKS

1. https://www.tutorialspoint.com/python3/
2. https://www.youtube.com/watch?v=Dl_dz1FOvcY&list=PLHT9VxUGxZRshJ-edzjLZ72HfSta8s5f
3. https://www.udemy.com/machine-learning-using-r-and-python/
4. https://www.udemy.com/r-programming-language/
5. https://www.simpliv.com/itcertification/data-analytics-using-r-programming
6. https://books.goalkicker.com/PythonBook/

MOOCS COURSES

1. https://www.coursera.org/learn/python-programming
2. https://www.edx.org/professional-certificate/python-data-science
3. https://www.edx.org/course/cs50s-web-programming-with-python-and-javascript
4. https://realpython.com/python-beginner-tips/

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

JAVA PROGRAMMING (Open Elective-II)

IV B. TECH- I SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS703OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. Introduces object-oriented programming concepts using the Java language.
2. Introduces the principles of inheritance and polymorphism; and demonstrates how they relate
3. to the design of abstract classes
4. Introduces the implementation of packages and interfaces
5. Introduces exception handling, event handling and multithreading
6. Introduces the design of Graphical User Interface using applets and AWT

COURSE OUTCOMES

1. Develop Programs with reusability
2. Develop programs to handle multitasking
3. Develop programs to handle exceptions
4. Develop applications for a range of problems using object-oriented programming techniques
5. Design simple Graphical User Interface applications

UNIT-I	OBJECT ORIENTED THINKING AND JAVA BASICS	Classes: 12

Need for oop paradigm, summary of oop concepts, History of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring string class.

UNIT-II	INHERITANCE, PACKAGES AND INTERFACES	Classes: 12

Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface,

applying interfaces, variables in interface and extending interfaces. Exploring java.io.

UNIT-III	EXCEPTION HANDLING AND MULTITHREADING	Classes: 12

Concepts of exception handling, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. String handling, Exploring java.util.

UNIT-IV	EVENT HANDLING	Classes: 12

Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

The AWT class hierarchy, user interface components- labels, button, canvas, scrollbars, text components, check box, check box group, choices, lists, dialog box, handling menus, layout manager: layout manager types – border, grid, flow, card and grid bag.

UNIT-V	MULTI-THREADING & APPLETS	Classes: 12

Differences between multi-threading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads.

Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

TEXT BOOKS

1. Java the complete reference, 7th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.

REFERENCE BOOKS

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. An introduction to Java programming and object-oriented application development, R.A. Johnson- Thomson.

WEB REFERENCES

1. http://www.developer.com/icom_includes/feeds/developer/dev-25.xml
2. http://www.ibm.com/developerworks/views/java/rss/libraryview.jsp
3. http://www.javaworld.com/rss/index.html
4. http://feeds.feedburner.com/DevxLatestJavaArticles

E -TEXT BOOKS

1. HTTP Programming Recipes for Java Bots by Jeff Heaton - Heaton Research, Inc.
2. Java Distributed Computing by Jim Farley - O'Reilly Media
3. Java Precisely by Peter Sestoft - IT University of Copenhagen
4. Java for Absolute Beginners: Learn to Program the Fundamentals the Java 9+ Way
5. Fundamentals of the Java Programming Language, Java SE 6
6. JAVA: Easy Java Programming for Beginners, Your Step-By-Step Guide to
7. Learning Java Programming
8. Android App Development in Android Studio: Java+Android Edition for Beginners

MOOCS COURSES
1. https://www.mooc-list.com › tags › java-programming 2. https://www.mooc-list.com › tags › java 3. https://www.edx.org › learn › java 4. https://www.quora.com › What-are-the-best-MOOCs-for-learning-Java 5. https://www.udacity.com › course › java-programming-basics--ud282 6. https://www.futurelearn.com › courses › begin-programming.

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

MACHINE LEARNING (Open Elective-III)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS800OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
2. To understand computational learning theory.
3. To study the pattern comparison techniques.

COURSE OUTCOMES

1. Understand the concepts of computational intelligence like machine learning
2. Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
3. Understand the Neural Networks and its usage in machine learning application.

UNIT-I	INTRODUCTION	Classes: 12

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT-II	ARTIFICIAL NEURAL NETWORKS	Classes: 12

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT-III	LEARNING	Classes: 12

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.
Computational learning theory – Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.
Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT-IV	GENETIC ALGORITHMS	Classes: 12

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.
Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.
Reinforcement Learning – Introduction, the learning task, Q–learning, non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT-V	ANALYTICAL LEARNING	Classes: 12

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.
Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.
Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOKS

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis

WEB REFERENCES

1. http://web.eecs.umich.edu/~cscott/past_courses/eecs545f09/bib.html
2. https://christophm.github.io/interpretable-ml-book/references.html
3. https://towardsdatascience.com/embedding-machine-learning-models-to-web-apps-part-1-6ab7b55ee428
4. https://link.springer.com/article/10.1007/s42979-021-00592-x

E -TEXT BOOKS

1. https://machinelearningmastery.com/products/
2. https://www.ibm.com/downloads/cas/GB8ZMQZ3

3. https://www.analyticsinsight.net/10-popular-must-read-free-ebooks-on-machine-learning/
4. https://alex.smola.org/drafts/thebook.pdf
5. https://www.analyticsvidhya.com/blog/2018/02/10-free-must-read-machine-learning-e-books/

MOOCS COURSES

1. https://www.geeksforgeeks.org/Machine Learning
2. https://nptel.ac.in/courses/106105087/pdf/m01L01.pdf
3. https://onlinecourses.nptel.ac.in/noc21_cs13/preview.
4. https://www.tutorialspoint.com/machine_engineering/index.htm

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

MOBILE APPLICATION DEVELOPMENT (Open Elective-III)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS801OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To demonstrate their understanding of the fundamentals of Android operating systems
2. To improves their skills of using Android software development tools
3. To demonstrate their ability to develop software with reasonable complexity on mobile platform
4. To demonstrate their ability to deploy software to mobile devices
5. To demonstrate their ability to debug programs running on mobile devices

COURSE OUTCOMES

1. Student understands the working of Android OS Practically.
2. Student will be able to develop Android user interfaces
3. Student will be able to develop, deploy and maintain the Android Applications.

UNIT-I	INTRODUCTION TO ANDROID OPERATING SYSTEM	Classes: 12

Android OS design and Features – Android development framework, SDK features, Installing and running applications on Android Studio, Creating AVDs, Types of Android applications, Best practices in Android programming, Android tools Android application components – Android Manifest file, Externalizing resources like values, themes, layouts, Menus etc., Resources for different devices and languages, Runtime
Configuration Changes Android Application Lifecycle – Activities, Activity lifecycle, activity states, monitoring state changes

UNIT-II	ANDROID USER INTERFACE	Classes: 12

Measurements – Device and pixel density independent measuring UNIT – s Layouts – Linear, Relative, Grid and Table Layouts User Interface (UI) components – Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Event Handling – Handling clicks or changes of various UI components Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities

UNIT-III	INTENTS AND BROADCASTS	Classes: 12

Intent – Using intents to launch Activities, Explicitly starting new Activity, Implicit

Intents, Passing data to Intents, Getting results from Activities, Native Actions, using Intent to dial a number or to send SMS Broadcast Receivers – Using Intent filters to service implicit Intents, Resolving Intent filters, finding and using Intents received within an Activity Notifications – Creating and Displaying notifications, Displaying Toasts		
UNIT-IV	**PERSISTENT STORAGE**	**Classes: 12**
Files – Using application specific folders and files, creating files, reading data from files, listing contents of a directory Shared Preferences – Creating shared preferences, saving and retrieving data using Shared Preference		
UNIT-V	**DATABASE**	**Classes: 12**
Introduction to SQLite database, creating and opening a database, creating tables, inserting retrieving and etindelg data, Registering Content Providers, Using content Providers (insert, delete, retrieve and update)		

TEXT BOOKS

1. Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox), 2012
2. Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013

REFERENCE BOOKS

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India (Wrox), 2013

WEB REFERENCES

1. https://www.tutorialspoint.com/mobile_development_tutorials.htm
2. https://www.javatpoint.com/android-tutorial

E -TEXT BOOKS

1. http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=http%3A%2F%2Fprojanco.com%2FLibrary%2FAndroid%2520App%2520Development%2520in%2520Android%2520Studio%2520%2520Java%2520plus%2520Android%2520edition%2520for%2520beginners.pdf&clen=10563468&chunk=true
2. http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=https%3A%2F%2Fwww.mediapiac.com%2Fuploads%2Fconference%2Fpresenters%2Fdocuments%2F17%2F8.pdf&chunk=true

MOOCS COURSES

1. https://onlinecourses-archive.nptel.ac.in
2. https://swayam.gov.in/
3. https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

SCRIPTING LANGUAGES (Open Elective-III)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS802OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. This course introduces the script programming paradigm
2. Introduces scripting languages such as Perl, Ruby and TCL.
3. Learning TCL

COURSE OUTCOMES

1. Comprehend the differences between typical scripting languages and typical system and application programming languages.
2. Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
3. Acquire programming skills in scripting language

UNIT-I	INTRODUCTION	Classes: 12

Ruby, Rails, The structure and Execution of Ruby Programs, Package Management with RUBYGEMS, Ruby and web: Writing CGI scripts, cookies, Choice of Webservers, SOAP and web services.

Ruby Tk – Simple Tk Application, widgets, Binding events, Canvas, scrolling

UNIT-II	EXTENDING RUBY	Classes: 12

Ruby Objects in C, the Jukebox extension, Memory allocation, Ruby Type System, Embedding Ruby to Other Languages, Embedding a Ruby Interpreter

UNIT-III	INTRODUCTION TO PERL AND SCRIPTING SCRIPTS AND PROGRAMS	Classes: 12

Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL-Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

UNIT-IV	ADVANCED PERL FINER POINTS OF LOOPING	Classes: 12

Pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands

Internet Programming, security Issues.

UNIT-V	TCL & Tk	Classes: 12

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface.

Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

TEXT BOOKS

1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Ruby Programming language by David Flanagan and Yukihiro Matsumoto O'Reilly
3. "Programming Ruby" The Pramatic Programmers guide by Dabve Thomas Second edition

REFERENCE BOOKS

1. Open Source Web Development with LAMP using Linux Apache, MySQL, Perl and PHP, J.Lee and B. Ware (Addison Wesley) Pearson Education.
2. Perl by Example, E. Quigley, Pearson Education.
3. Programming Perl, Larry Wall, T. Christiansen and J. Orwant, O'Reilly, SPD.
4. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
5. Perl Power, J.P. Flynt, Cengage Learning.

WEB REFERENCES

1. http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=http%3A%2F%2Fpages.di.unipi.it%2Fcorradini%2FDidattica%2FAP-19%2FDOCS%2FScott-ch13.pdf&clen=4675371

E -TEXT BOOKS

1. https://www.nocostlibrary.com/2021/07/the-world-of-scripting-languages-no.html
2. http://efaidnbmnnnibpcajpcglclefindmkaj/viewer.html?pdfurl=http%3A%2F%2Fwww.cs.stir.ac.uk%2Fcourses%2FCSC9Y4%2Flectures%2Fscripting1a.pdf&clen=2960972&chunk=true

MOOCS COURSES

1.https://onlinecourses-archive.nptel.ac.in
2.https://swayam.gov.in/
3.https://swayam.gov.in/NPTEL

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

DATABASE MANAGEMENT SYSTEMS (Open Elective-III)

IV B. TECH- II SEMESTER (R20)

Course Code	Programme	Hours/Week			Credits	Maximum Marks		
		L	T	P	C	CIE	SEE	Total
CS803OE	B. Tech	3	0	0	3	30	70	100

COURSE OBJECTIVES

1. To understand the basic concepts and the applications of database systems.
2. To master the basics of SQL and construct queries using SQL.
3. Topics include data models, database design, relational model, relational algebra, transaction control, concurrency control, storage structures and access techniques.

COURSE OUTCOMES

1. Gain knowledge of fundamentals of DBMS, database design and normal forms
2. Master the basics of SQL for retrieval and management of data.
3. Be acquainted with the basics of transaction processing and concurrency control.
4. Familiarity with database storage structures and access techniques

UNIT-I	DATABASE SYSTEM APPLICATIONS & INTRODUCTION TO DATABASE DESIGN	Classes: 12

A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.
Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

UNIT-II	INTRODUCTION TO THE RELATIONAL MODEL	Classes: 12

Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT-III	SQL	Classes: 12

Queries, Constraints, Triggers: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.
Schema refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD

normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

UNIT-IV	TRANSACTION CONCEPT	Classes: 12

Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

UNIT-V	DATA ON EXTERNAL STORAGE	Classes: 12

File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

TEXT BOOKS

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill 3rd Edition
2. Database System Concepts, Silberschatz, Korth, Mc Graw hill, V edition.

REFERENCE BOOKS

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education
4. Oracle for Professionals, The X Team, S.Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

WEB REFERENCES

1. https://www.ddegjust.ac.in/studymaterial/mca-3/ms-11.pdf
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.geeksforgeeks.org/introduction-of-dbms-database-management-system-set-1/
4. https://www.tutorialspoint.com/dbms/index.htm

E -TEXT BOOKS

1. Database Management System by Monelli Ayyavaraiah, Arepalli Gopi
2. Database Management System by Panneerselvam, R.

MOOCS COURSES

1. https://www.mooc-list.com/tags/database-management
2. https://nptel.ac.in/courses/106/105/106105175/
3. https://www.edx.org/learn/databases